FOOD MANUFACTURE

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Food Survey

IT is impossible to say whether, by the time these words are published, the Government will have taken the step of rationing bread and flour. The lengthening of the wheat extraction to 90 per cent. and the admixture of 10 per cent. or so of barley flour is a relatively simple matter. The rationing of flour is more complicated. Flour for all uses has to be controlled; and it seems probable that about 15 per cent. of it has been used for the manufacture of biscuits and confectionery and a further 15 per cent. or so for the domestic baking of pies, pastries, and so forth. Obviously there would have to be an alternative between bread and flour granted to the consumer, especially as there is still a small but significant amount of home bread-making customary in the north.

A differential bread ration between light and heavy workers is fairly easy to contrive, but not so simple to predict. There is no guarantee that the heavy worker will consume his whole allocation, and indeed the precise response of any given country to a system of bread rationing cannot readily be foreseen. The scheme has usually to be adjusted in the light of experience, and unfortunately we have little time to gain the necessary experience.

The cut in allocation of flour for biscuits and confectionery leads to conjectures on the best use to be made of the produce. It might have to be rationed on a points basis to prevent discrimination between customers or the emergence of a "black market." On the other hand, there is something to be said for allocating a fair proportion of it to consumers in factory canteens, youth clubs, and other institutions. That might help to encourage industrial output, where the restriction in food supplies would psychologically tend to delay the rate of our industrial recovery.

A Washington survey shows that there has been, as was expected, a considerable decline in cattle numbers throughout the world; but, as the survey points out, the decline will not be as great as that for pigs and poultry. The European decrease is placed at about six million head since the beginning of 1945. The decline is more marked in Germany and the Danubian countries, where heavy fighting took place. In North America there has been a decline of somewhat over two million head. On the other hand, the U.S.S.R. has managed to increase its cattle stock in the same period, partly by requisitions from conquered territories, by over three million head. The losses in the U.S.S.R. had, however, been very considerable. By the beginning of 1945 the total world cattle numbers are reckoned to have been about thirteen million below the 1936-1940 average. Norway, Sweden, and Belgium are said to be again building up their cattle stocks. But in Poland and Greece the cattle population appears to be no more than half its pre-war number. In all countries of Europe the rate of increase will depend on the extent to which feeding stuffs and land have to be used for human consumption; it will further depend on the extent to which the needs of men demand the killing off of cattle.

Frozen Cooked Food

A statement made in the House of Commons by Dr. Edith Summerskill, Parliamentary Secretary to the Ministry of Food, suggests that the development of the frozen cooked food industry in this country will be retarded by the world food situation. Saying that although the Ministry was interested in the process and that any new process such as this was duly investigated, development on a large scale was impossible during the present stringency, it would be impossible to allocate large amounts of food for experimental purposes.

It is strange to note the adjective "new" applied to cooked frozen foods by Dr. Summerskill in view of the progress made in this country and the U.S.A. in their production.

A paper by J. G. Woodroof and Ida S. Atkinson of the Georgia Agricultural Experiment Station, describes results arising from seven years' study of the effect of heating fruits, vegetables, meats, and combination foods before freezing, on their quality after freezing, thawing, reheating, and serving.

Apples, blackberries, cherries, and raspberries

were excellent when cooked by immersing in boiling 50 per cent. syrup for fifteen seconds prior to freezing. Pre-heated fruits are sold packed in rigid, leak-proof, moisture-proof containers.

Cooked *purée* of carrots, beet, spinach, peas, asparagus, and green beans retain excellent odour and flavour during storage periods of one year or more. Frozen cooked spinach retains 63 per cent. of the original vitamin C. for twelve months; peas 76 per cent. for six months, and similar figures were found for vitamin B_2.

Unlike fruits, blanching vegetables for two or three minutes does not constitute pre-cooking, as about ten times this amount of heating is required to tenderise and develop flavours in most vegetables.

According to U.S.A. reports, there seems little demand for frozen fried meats, such as steaks, chops, etc. Experience has shown that these foods held in storage lose crispness and gradually develop a "warmed-up" flavour, because it is not practical to produce a solid pack with them. However, large cuts of meat can be frozen when adequately wrapped; and even meat broth can be satisfactorily kept for many months.

"Combination dishes" of meat and vegetables have already gained popularity in the U.S.A. and are on the grocers' shelves. Bread, biscuits, cakes, and pies have also been kept successfully provided they are packed to avoid desiccation.

This form of preserved food is particularly applicable to present-day conditions, and, as Dr. Summerskill remarks: "If this service became available at a low price, it would have a great future."

Demand for Ice Cream Conservators

Production is now being stepped up on commercial small retailer type conservators and refrigeration plants for installation in retail shops, principally for the ice cream and confectionery trades.

Manufacturers in Scotland, engaged on this work, are known to have expanded their plants and to be capable of improved outputs. The position, according to one leading firm, is that most of the firms involved are heavily sold for a period of perhaps two to three years ahead. Agents, however, are in many instances building up order books for delivery as and when opportunity permits, even if, as in some cases, that date may be a year ahead. While the system has the advantage of filling the agent or wholesale house with business for some long time ahead, and with an assured and controlled outlet for all deliveries from makers, it has also the disadvantage that some at least of the business may not mature if the retailer is more fortunate in the interval in obtaining equipment elsewhere.

Against that is the fact that expansion of ice cream trading is limited by the shortage of materials and likely to be so for some considerable period ahead. That being so the supply of ice cream equipment may well keep pace with increasing availability of ingredients and thus allow expansion at the appropriate time.

Meantime retailers are buying heavily whatever equipment they can find, much of it second-hand, and much, according to refrigerating firms, of doubtful value.

Quick Freeze Herring a Success

The Herring Industry Board has now reported that quick freezing experiments carried out on herring at Fraserburgh and Yarmouth have been demonstrated as both scientifically and commercially sound. This has encouraged the Board to proceed with the establishment of a plant at Lerwick, which will operate on an increased scale in the coming season while other plants will be operated as opportunity permits. The scheme was interrupted by limiting factors—the failure to obtain full deliveries being one—but despite these problems, the essential success of the system has been established and retailers and merchants are all fully satisfied. A slightly higher cost than for fresh herring has been considered a fair proposition, while the purchase of raw material at a slightly lower cost than that of fresh herring has also been indicated as essential.

Self-Sterilising Coating for Foods

The development of a new coating which prevents bacterial growth is described by Alexander Goetz (*Can. Paint and Varnish Mag.*, 19, 1945). Adsorption of active silver on colloidal carbon produces a pigment which may be incorporated in a vehicle exhibiting self-sterilisation properties. The ions of silver represent one of the most potent and least toxic germicides known, and are odourless and tasteless.

By absorbing the metal on or within the oxidation layers of colloidal carbon particles, this state of active silver can be produced and maintained. Colloids of this type can be incorporated as pigments into suitable binders and used as coatings on paper, Cellophane, Pliofilm, metal foil, glass, etc.

Cocoa and Calcium Utilisation

Manufacturers in the cocoa industry are watching closely the controversy as to whether cocoa adversely affects calcium utilisation in the human metabolism, either through its oxalic acid content or through some other cause.

The case for further investigation rests on experiments on rats (*J. Amer. Med. Assoc.*, 1945, 129, p. 871), which revealed that low grade cocoa,

containing a proportion of cacao shell and less than the average fat, depresses calcium retention about twice as much as can be accounted for by its oxalic acid content. Medium grade cocoa was found to depress calcium utilisation only in proportion to its oxalic acid content.

Tests on human subjects with a medium cost cocoa did not confirm the applicability of these results to the human metabolism, but the investigators cautiously point out that the negative results may mean that the method of study is not sufficiently sensitive to detect adverse effects. On the other hand, it is known that rats do not utilise some forms of calcium as efficiently as does the human body.

Other foods containing oxalic acid in proportions comparable with those present in cocoa—*i.e.*, 0·5 to 0·6 per cent.—are gooseberries, green beans, carrots, and celery stalks.

New Market Research Method

An improvement on the old-time grocery system of allowing the customer to sample a piece of cheese before ordering is a new method of testing consumers' tastes and preferences now being tried out in the United States by General Mills, Inc.

This comprises a free "sip and snack" bar, where customers voice their opinions on a pre-marketing basis.

It was first tried out in a large Minnesota department store, the food bar providing a restful, attractive setting for busy shoppers to rest and partake of a beverage, a muffin, piece of cake, etc.

In exchange for the free sample of food the shopper answers a short questionnaire concerning the taste, colour, and consistency of the food being sampled. Information is also solicited on the frequency with which a similar product is served in the shopper's home.

Antioxidants for Fats

Rapid methods for evaluating stability of fats have been reported by Riemenschneider *et al.* (*Oil and Soap*).

A comparison was made of stability values and protection factors as determined by three widely used rapid methods—the active-oxygen, the oxygen-absorption, and the oven-test methods. In most instances there was fair agreement between the results obtained by the active-oxygen and oxygen-absorption methods, as indicated by protection factors. In general, use of dry air instead of moist air in the active-oxygen method resulted in little significant difference in the stability values, although in some preparations differences were found that may be significant. Use of dry oxygen in the active-oxygen method gave results comparable with those obtained by the oxygen-absorption method. In experiments in which an oven test was also used the protection factors in most cases were in general agreement with the other two methods.

The synergistic antioxidant effect of acidic compounds with phenolic antioxidants was most pronounced when lard of low stability was used. Likewise the protection factors were disproportionately greater when antioxidants were added to lard of low stability. The results indicate that comparison of antioxidants by means of protection factors is valid only when the same substrate is used. Protection factors so obtained help to evaluate the order of effectiveness of various antioxidants, but do not yield a strict quantitative comparison of the protective power of the antioxidants when applied to other substrates.

Some Nutrition Problems

Some interesting points were raised at a recent meeting of the Scottish Group of the Nutrition Society which emphasised the intricacies of nutritional science.

Prof. E. P. Cathcart, F.R.S., discussing the role of nutrition in social medicine, said that while he recognised the difficulty of finding a yardstick for nutrition, he was dissatisfied with the modern emphasis on increased height and weight. Mere size was no guide to nutrition; the athlete who appeared thin to the verge of emaciation might be in perfect training and presumably in a state of optimum nutrition. Good nutrition was the end-result of perfect environmental conditions in the widest sense, including adequate food, sleep, play, housing, and psychosomatic relationships. Moreover, it was not a fixed and static state but a fluctuating one.

Speaking of high protein diets, Prof. Cathcart said that no adequate explanation had yet been found as to why people doing hard muscular work demand a high intake of meat. It could not be required for tissue maintenance, since even with the hardest worker, if the energy requirements were provided for, the extent of muscle breakdown, as evidenced by increased nitrogen output, was small. Nor did muscular work seem to be carried out more effectively on high protein diets than on normal ones. It was a fact, however, that the more virile races of the world were all large consumers of meat, and an investigation into the diet of 4,700 athletes of the forty nations attending the Olympic Games at Berlin in 1936 showed that the great majority of the athletes were large consumers of animal protein.

Prof. Cathcart said he thought most of the figures published for the vitamin requirements were on the high side. In the study of nutrition the greatest need today was more and better experiments on human beings.

Patents Law and Income Tax

With the importance of patents nowadays it might be useful to note the alterations in law and procedure of Income Tax by the special Income Tax Act, 1945, in operation from April 6, 1946, of the late Coalition Government.

Prior to this Act the taxation position had been that in the case of an out-and-out sale for a lump sum that sum was not assessable, being treated as capital, although if the user of a patent was transferred for a lump sum it was assessable, as is the case where the inventor receives income in the form of royalties.

By this new law if capital is expended on the purchase of rights an annual allowance will be made of the expenditure spread over seventeen years, and if the case concerns a specified period that period will apply instead of the seventeen years.

With possible extensions in certain circumstances the life of a patent is sixteen years, so that tax paid on amount expended out of profits will be allowed for during the life of the patent.

The vendor, however, will be liable to tax on the capital amount received, but this can be spread by yearly payments over a period of six years, not seventeen years; if the taxpayer chooses, however, he can be assessed for the whole sum in the year of assessment in which the amount was received.

As regards a royalty or lump sum in respect of a past user of a patent the tax can be spread over six years; if the period under review is less than six years but more than two years the tax would be spread over the appropriate number of complete years.

Use of Enzymes in Lard Rendering

One of the newest applications of enzymatic action appears to lie in fat rendering, where the use of such a substance is believed to bring about a more complete and rapid breakdown of the fatty material being processed with a consequent reduction in rendering time and an increase in fat yield. A large packing company (states *The National Provisioner*) has recently resumed research in connexion with the use of enzymes in lard rendering, although it will only go as far as saying that this has some "interesting possibilities."

It is said that the proteolytic enzymes in a concentrated solution, sprayed over the fatty material in the grinder as it is being hashed through the three-quarter inch or finer plate, break down the walls of the cells containing the fat, and that this cell breakdown results in its more rapid and complete release during the subsequent heating operation. The action of the enzymes is comparatively rapid and the warm-up period provides the time necessary for the material to do its work. It is recommended that the rendering be done at a temperature of 240° F.

It is claimed by the concern engaged in the distribution of the proteolytic enzyme material that in addition to higher yields and a rapid cook, lard rendering by this method has better keeping quality, improved flavour, and a higher smoke point.

On the basis of the facts available, it seems probable that the process, in its present stage of development at least, would be most useful in small meat-processing establishments which employ high quality leaf and back fat and which use the open kettle method to produce a relatively small volume of lard.

Music with the Menu

According to the Army journal *Conqueror*, published at Osnaðruck, music played at meal-times in a large Army mess has resulted in a 10 per cent. fall in bread consumption, a drop which saved 900 loaves within a fortnight. Here, evidently, is one experiment we commend to Sir Ben Smith in his crusade to cut down consumption of bread—or even of other foods. In this campaign, as in others, the band must lead the way; while a few apt slogans would not be out of place. "A few rolls on the drums, but no rolls on the table." "Give us the symphony and dispense with the soup." "More Bach, less bacon!" Though the whole idea is in contrast to the belief that music causes gastric juices to flow (just as the dinner gong brought saliva to the jaws of Pavlov's dogs), there should be no such difficulty in broadcasting days in supplying music on tap as there was in the past. In 1822, wrote Thomas Moore in his Diary, "when the great waterworks were established at Chelsea, there was a proposal for having there also a great organ, from which families might be supplied with sacred music, according as they wished, by turning the cock on or off." To this scheme Moore's friend Jekyll waggishly objected, since with a thaw following a prolonged frost "you might have *Judas Maccabaeus* bursting out at Charing Cross, and there would be no getting him under." There was a similar project at Lansdowne House for seven-and-twenty fiddlers, hermetically sealed, in an apartment underground from which music might be communicated by tubes to any apartment where it was wanted. But in the new scheme we offer to the Minister of Food for "more music, less meat," or for "more composers, less cooks," the radio will sustain every home. One final point is that such wide distribution of music might also increase yields from food producers while satisfying food consumers; for it was at Stockholm some time ago that gramophone records, played for four or five hours a day to milch cows while chewing their cud, were claimed to increase milk yields.

Quick Freezing at Leith

This article describes the activities of a firm who, among others, is working to put British quick freezing of food on the map.

Specimens of quick frozen fish.

EXPERIMENTS begun in 1942 by the North British Cold Storage and Ice Co., Ltd., Leith, on the quick freezing of food have now reached a satisfactory stage at which the company is preparing a full-scale commercial plant for bulk quick freezing of a wide variety of commodities.

The plant at which experimental and later commercial runs were made is not new in principle, but is new in type as applied to quick freezing, and has proved so satisfactory and economically sound as to favour the plans now developing.

To date, the most serious handicap to quick freezing has been the general lack of bulk supplies of food to permit a full-scale, all-out, long-term test of the plant, commercial work having been confined of necessity to only limited runs. From these, however, adequate data have been gathered to convince the sponsors of the soundness of the progress and the need to continue and expand the work already done.

Initial Experiments

Starting on the basis that there was, under normal conditions, a very big field of operation available, Mr. James McKenzie, managing director of the company, initiated these experiments individually with a view to obtaining a sound experience of the methods and practices involved, so that adequate experience in the technique of quick freezing might be available when conditions permitted it to play a part in the nation's food economy.

Invaluable aid has been given in these years of work by the D.S.I.R., the machinery builders, and British and U.S.A. publications.

Initial experiments aimed at ascertaining the most successful form of plant and the examination of the food to be processed and stored. Case histories, showing completely successful results, demonstrate how adequately these tests have served.

Kippers, herring, meat, trout, and strawberries have all been retained at $-20°$ F. for a period of one year, which is considered the maximum economic period such commodities can justify.

Plant Developments

The plant now being developed consists of a freezing chamber 10 ft. × 30 ft. × 10 ft. high with two sets of rails feeding in at one end and out at the other. Insulation is 6 in. of slab cork to bottom and sides on a 6 in. concrete raft.

Each set of rails accommodates five trucks, on which metal grids are arranged for the carriage of the metal trays on which the food is packed. A battery of eighty galvanised gilled cooling coils is fitted on the upper section of the tunnel with a galvanised steel tray separating the coils from the trolleys.

Four airscrew type propeller fans circulate air horizontally across these coils and then back across and between the trays or packages on the trolleys from side to side. The total volume of air circulated is large in relation to the cooling duty, so that the temperature rise between one side and the other is very small.

This feature, combined with the very large amount of cooling surface provided by the gilled cooling coils, which ensures that the air is cooled to a temperature close to the temperature of the evaporating ammonia within the coils, makes certain that surface drying of the produce frozen is kept to a minimum.

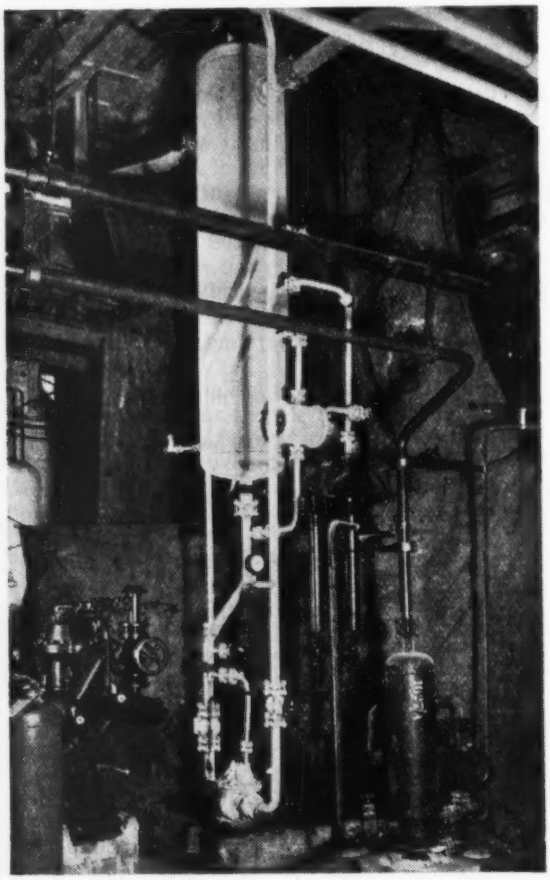
Air Control

The air velocity over the produce to be frozen depends upon the spacing of the trays or packages on the trolleys, but has been designed to be between 600 and 1,200 ft. per minute. The equipment has been planned to maintain an air temperature of $-30°$ F. when operated at full designed

capacity. While it has not yet been possible to test the equipment at fuli capacity, trials indicate that there will be no difficulty in maintaining this temperature, and temperatures as low as −55° F. have been obtained.

Direct control of the product when in process is assured by the use of a draught gauge. This indicates the continuity of air flow and offers an excellent index to proper packing of trays on the trolleys, any undue resistance to the air flow—as by faulty packing or otherwise—being registered on the gauge and indicating the need for immediate attention to correct the defect which has developed. There is also an electrical resistance type thermometer system, registering on the ground floor, which gives excellent remote control of conditions in the freezer. One record indicates the air flow temperature and the other the internal temperature of the material being processed, this being transmitted from a long spiked thermometer bedded in the commodity concerned.

On emerging from the freezer, trolleys will be directed through an aperture into the low temperature cold store, now under construction, alongside the freezer. This store will be insulated overall with 12 in. of slab cork and will, when completed, be capable of handling the anticipated output of the plant.



Accumulator and pre-cooler.

Handling Problems

Details are now being worked out to determine the most suitable and economic handling of packs. It is a defect—although perhaps also a virtue—that the plant can handle any one of a wide range of products and has been designed primarily from that viewpoint. It is also a defect that it has to be erected on an existing site, taking due recognition of the difficulty of achieving the ideal straight-flow system possible in an entirely new factory designed, as some in the U.S.A. and Britain are, to handle only one commodity. In such circumstances the problems of mechanised handling are elementary as compared with such a situation as this, in which a variety of packs demand a greater flexibility of mechanised handling.

As at present visualised the product would be prepared on the ground floor, taken by hoist to the quick freeze floor, assembled on trays, manhandled into the freezer, and then out into cold store. The full operation of these arrangements will only be demonstrated by working experience.

The racks on the trolleys can be adjusted to carry trays, cartons, boxes, or other containers of a varied size and type, thus accommodating a number of products and industries.

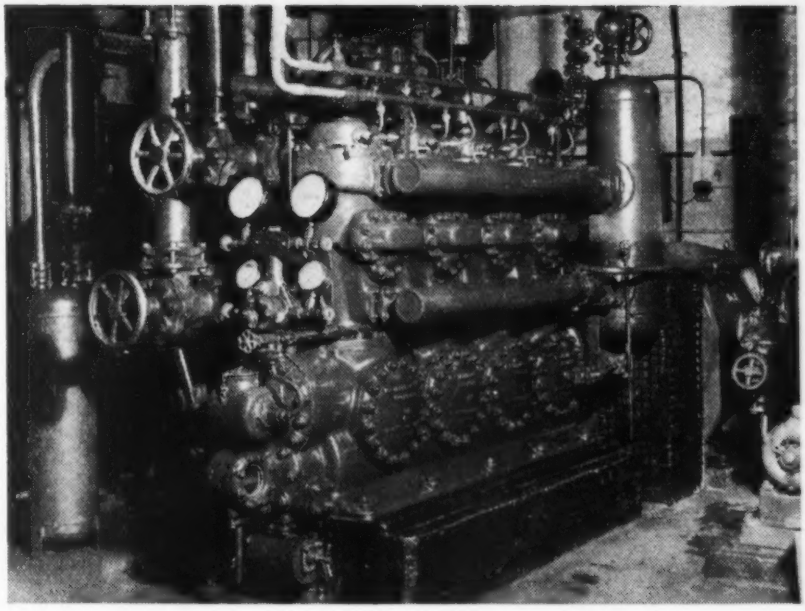
A point of interest which has emerged in this connexion is worthy of note. The mere fact that trays can be adjusted to suit any type of pack does not justify the use of any but the most suitable. To waste time and money on the freezing of a container or on a section of produce greater than the most economic size would be to abuse the potentialities of the plant.

Container Types

Considerable experiment has been carried through to determine the most satisfactory type of container and the most economic bulk of load per container. Thus a 6 in. deep standard wooden box of sprats took thirteen hours to come from +40° F. to −20° F., whereas a 2 in. deep load of the same fish on a metal tray achieved the same temperature (−20° F.) in one and a half hours.

A 1 stone box of kippers approximately 6 in. deep took three hours to drop from +36° F. to −20° F., while a cod weighing 27 lb. took four hours to reach −20° F. from +30° F. All these were in an air flow of 900 ft. per minute.

These experiments convinced those concerned of the need to reduce the load to the economic level and to avoid poor conductors such as wood. The use of metal trays is now standard practice.



Type of two-stage compressor.

Experiments with wooden boxes when empty showed that the time involved in reducing the internal air temperature from +25° F. to zero was two hours, demonstrating the waste involved in the use of wood as a container.

Experiments were also undertaken to determine the time involved in reducing the tunnel itself to −20° F., the average period being fifteen minutes.

Output Possibilities

For the initial experiments in quick freezing a small booster compressor was used which gave an output sufficient to freeze some 10 cwt. of fish per day. Although perfectly efficient, this small machine had not the capacity to deal with the volume of produce necessary to make the plant a commercial proposition. When the present quick freezer, directly coupled to an 85 B.H.P. motor, was installed, this machine, at a temperature of −30° F., developed sufficient capacity to freeze some 20 tons per twenty-four hours. The compressor is a type 4WC, four-cylinder, two-stage ammonia compressor manufactured by L. Sterne and Co., Ltd., of Glasgow. This type of machine has been specially developed by the manufacturers for low-temperature work. By the use of two-stage compression it is possible to obtain the low temperatures necessary for quick freezing with much greater efficiency and with much lower power consumption than would be necessary with the usual single-stage type of machine.

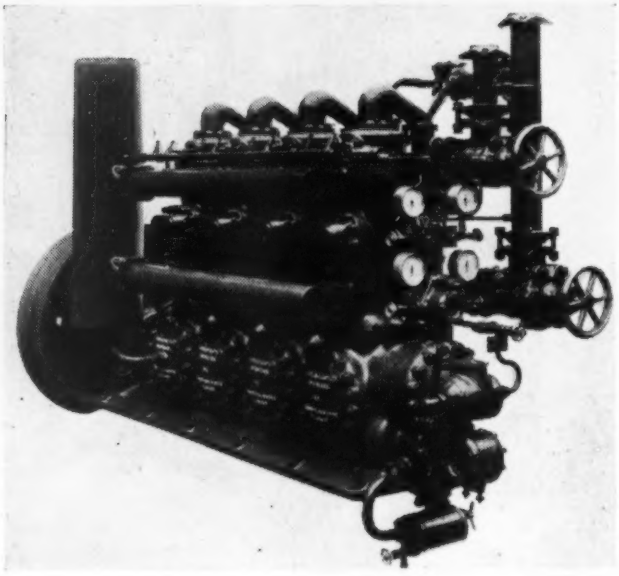
On this particular plant provision is also made for pre-cooling the warm liquid ammonia from the condenser by evaporation at the intermediate pressure. This feature gives a further substantial increase in capacity for only a small increase in power consumption. The gas is also cooled between stages of compression by liquid ammonia injection. Although this two-stage compressor has been installed primarily for quick freezing duty it can also be used when not required for the quick freezer on the ordinary cold storage and ice-making duties. When the quick freezer is in use the suction of the two-stage compressor is connected to a large ammonia accumulator or liquid separator vessel. The liquid ammonia from the condenser, after passing through the pre-cooler, is fed into this liquid separator vessel. The liquid in this vessel is recirculated by a small motor-driven centrifugal pump through the gilled cooling coils in the quick freezer. Automatic float-valve regulators automatically control the liquid level in the pre-cooler and liquid separator. The air-cooling coils can be easily defrosted by the injection of hot gas. The whole operation of defrosting these coils can be carried out in less than thirty minutes.

Equipment installed for the holding rooms include a separate small two-stage compressor driven by a 35 h.p. motor in conjunction with a brine-sparged air cooler. A further advantage of the system adopted lies in the fact that the small compressor is cross-connected to the main large two-stage machine so that, in an emergency, this latter main machine could maintain the L.T. store while also serving the freezer. The suction manifold of the large machine is also divided into two sections so that two of its four cylinders can be used on L.T. work while the other two are used on ice making or normal cold store work.

Application of the Plant

It is proposed, when conditions and volumes of supplies again permit, to service the food-producing industries with facilities which normally have been so far limited to either large individual concerns, working for their own interests, or to public bodies working in the national interest.

It is not intended to enter the field of production and preparation if this can be avoided, the company being of the opinion that it is the function of such a plant to service retailers, wholesalers, or producers and not to enter into productive activity or retailing activity. This emphasises, of course,



The two-stage compressor before installation.

the necessity of these industries to guarantee to the plant a satisfactory and maximum volume of throughput, of whatever food commodities are available, to ensure that the facilities are worked to the fullest advantage. The problem is not new, and was met this past year by the Herring Industry Board, and will presumably be met again in the future. It is emphasised that there is a responsibility on the wholesaler, the producer, and the retailer to make use of such facilities, especially in glut periods, and to organise so as to make such a plant—available for service to all clients and for all products—an economic possibility. It is difficult to avoid the belief that, failing such support, there would be a corresponding temptation on the part of an operator to find the commodities himself, and to enter into retail trading, in an effort to maintain his plant at full capacity.

What is rather desired is that producers should plan for glut periods and so prepare their produce, be it meat, vegetable, fish, or game, to ensure that it comes to the quick-freeze plant in a condition which necessitates the minimum preparation at the plant. Fishing industry interests might well consider, for instance, the gutting and cleaning of glut catches to a condition at which they could be quick frozen in a ready-to-use condition when released in a period of scarcity. By this method the bulk of produce frozen is reduced by the extent of offal removed and an increased all-food freeze permitted. The offal could be immediately used by manure manufacturers or other interests, and it might be suggested that the cost of gutting and freezing might be largely offset by the value of offal and the increased attractiveness of the fish to the housewives who would be saved the unpleasant work of gutting.

In the meat industry deboning and preparation of cuts might be a similar pre-freezing service performed by the meat trade before sending their product to the freezer. The vegetable and fruit industry would similarly require to prepare ahead to limit the preparatory work in the freezer plant.

Were these not done elsewhere the cost of preparation, the space and scope, and the skilled labour needed would make it a costly matter for the freezer operator.

For these reasons it is intended, as far as possible, to secure co-operation in preparatory work from the industries involved.

Service Costs

The cost of such a service to any industry must depend on the value the industry places on the service as well as the actual operational cost involved in the process. While it is rather early to give possible data on costs, the company believes that produce can be quick frozen and cold stored for a short period at a cost in the region of one penny per lb. It is argued that while no food should be held, under normal conditions, for more than a year, a preferable system might be a maximum retention of only three months on the grounds that the greater extent of turnover achieved, the greater the economy of operation. This must be limited, of course, in some circumstances by the rotation of glut and scarcity. In the herring industry, herring caught in July will be wanted in the months of January and February, when landings are very light. Autumn fruits will be wanted in January-April, when no supplies of any sort are normally available. The term of retention might therefore have to be extended to six months despite the ideal of a three-monthly turnover.

One important aspect of this cost of one penny per lb., as visualised by the company, is that fish caught at glut periods may fail to find a buyer. They have absolutely no market value and would be dumped or processed. If processed they would bring only a very small return. At a cost of one penny per lb. the valueless food would be transformed into a product which, at a date some months ahead, may take market price, or, if free markets operated again, higher than market price by reason of their availability in times of acute shortage.

The operation of a quick freezer must therefore be regarded as having a greater value and performing a greater service in that it has the capacity to convert food valueless at one period into extremely valuable food a few months later. An excellent system, and one which the Leith company advo-

cates, is the stabilisation of prices over the season. When food is again in reasonable or plentiful supply prices at glut or maximum periods should be maintained at a level to allow quick freezing of surpluses, which would then be marketed in the period of scarcity at a price comparable with, or even similar to, that ruling in the period of greatest availability.

Distribution

It is proposed that distribution of quick-freeze foods should be carried out by small insulated road vehicles.

It has been demonstrated by experiment that frozen fish, if bulk loaded, will go for some three or four days without deterioration. The process of defrosting will automatically start as soon as the product is placed in the hands of the retailer, who need not have L.T. holding rooms (which he probably could not in any case afford) provided that he orders the release of his requirements from the main store in quantities equal to his requirements. With a normal delivery service his turnover could be serviced every second or third day, or oftener if necessary, and he would clear out his stock as it comes through the release only in relation to his known demand.

Defrosting

Considerable attention has been paid to defrosting, and it is anticipated that the development of such a service will demand public education in the processes of defrosting. In a survey prepared by the Torry Research Institute it is indicated that on no account should hot water be used to thaw out fish, since this treatment results in softening due to partial heating of the flesh. In winter, however, a jet of steam or hot water could be used to bring up the temperatures of the water to about 60° F., above which appearance and texture of the fish begin to be harmed.

Care must be taken against the steam or hot water coming into contact with any of this fish. A water-mixing chamber kept separate from the fish section would be desirable if steam were used. Warm water would be best applied by running it into the pipe carrying the cold water, although this wastes heat as well as water unless some system of recirculation over an immersion heater were devised. If several blocks are to be thawed at a time a frame-work, similar to a large toast rack, could be used to hold them apart.

In cold air thawing is very slow, a 1-stone box of fillets taking nearly a week at 40° F. in still air and two nights and a day in a fair breeze. On the other hand, if warmed air is used care has to be taken to avoid too much surface evaporation, which may result in a dried appearance as well as loss of weight. Placing the frozen fish near a fire to thaw is not to be recommended for this reason. Creating air movement by means of a small fan expedites thawing. With gently moving air (at about 3 ft. per sec.), although the temperature of the air may be as high as 140° F. at the beginning of thawing, it should not exceed 70° F. when the outer fish are soft. Under these conditions, which would require rather careful watching, thawing is as rapid as with running water at 60° F. However, thawing in air has no particular advantages to recommend it over thawing in water, and, although the paper in which the blocks are wrapped might protect the fish from obvious drying out, the process is rather messy, since trays will be required to collect the "drip" that exudes during thawing.

The formation of "drip," which is mainly water and may vary in amount from 3 to 15 per cent., depending on the previous history of the frozen fish, is quite a normal phenomenon and does not adversely affect the food value of the fish. "Drip" cannot be prevented by any special thawing technique, although it is probable that total losses due to evaporation and "drip" will be less in the case of fish thawed in water.

Future Prospects

Experimental and commercial quick-freeze work at Leith has been done on most of those food products which might be expected to have importance when food conditions revert to normality. Fish has

Battery of gilled coils in the quick freezer.

been prominently involved, perhaps because of the seasonal and glut aspects of the industry and because of the proximity of Leith Docks, Newhaven, and Granton Harbour.

Kippers, trout, and salmon have all been treated and held for periods of one year at −20° F. with complete success. Kippers were sent by air some six months ago to the Scots regiments in Berlin, this proving an interesting example of reprocessing processed food. In this instance weather conditions had tended to make the kippers less satisfactory than might have been the case, but by a secondary processing this deterioration was avoided. There is thus a prospect of such secondary control becoming a normal practice to extend the period of virtue of kippered fish. Herring have been successfully quick frozen under similar conditions and for a similar period.

Meat has been used experimentally, both as cuts and as carcase, to determine to what extent the bulk and nature of the meat affects the processing. In one such instance four carcases of pork were processed as sides, one of each being quick frozen and one slow frozen and all cold stored at the normal cold storage temperature and condition of +15° F. Results to date indicate that quick freezing gives a rather better retention of weight, while the juices are retained to a greater extent than by normal cold storage methods.

Strawberries have been stored after quick freezing for one year with complete success, while raspberries, held without pretreatment, have remained in excellent condition after a year. Green peas, again without pretreatment, are magnificent after six months; tests are continuing to determine reaction to other types without pretreatment or precooking.

Poultry and game have also been successfully processed and will be handled when supplies permit, and a close watch is being kept on other work in the field, including the handling of butter, cream, baked products, fruit juices, rhubarb, peaches, cherries, and eggs. Some of these may not enter into the food picture so far as Scotland is concerned, although it might be unwise to prophesy as to that. White fish, game, herring, soft fruit, kippers, choice cuts of meat, mutton, and poultry are products which will positively be available again in due course and in fair bulk in Scotland, offering ample opportunity for the commercial application of the plant and plans now being prepared.

Long-Term Policy

The policy is essentially a long-term one and bound by Ministry of Food controls and shortages. The only commodity readily available for processing at this time and then not in any great bulk is fish, which makes the plant, as yet, not an economic proposition.

What is much more interesting is the development of a quick-freeze plant available to producers on normal commercial terms. It is perhaps the first in Britain to afford such facilities to the general food producer, other plants being linked with existing food manufacturing organisations and being confined solely to their own use.

Whether a sufficient volume of work will materialise in the next few years and to what extent the average food producer, wholesaler, or retailer will adopt the technique remains to be seen. It might well be argued that the facilities provided here could be used to supplement normal warehousing practice, and if they assisted in cutting out the loss annually developing even in the best regulated warehouses the service would be justified quite apart from the very obvious value offered in controlling gluts.

Plastics Aid Sugar Production

COMMERCIAL units are being built in the U.S. that will result, it is claimed, in an increase up to 20 per cent. in the sugar yield of cane and beet. Employing new chemicals, known as ion-exchange resins, impurities may be removed from the sugar syrups during extraction processes which normally cause a considerable portion of the sugar content of the cane or beet to be lost in the by-product—blackstrap molasses.

Based on the principle of the ionisation of electrical conductors in water, the two types of resin used are capable of combining with undesirable ions in the processing solution; in the case of potassium chloride, one resin exchanges a molecule of hydrogen for potassium, while the other liberates oxygen and absorbs chlorine. The oxygen and hydrogen combine to form water which may be vaporised and the plastic removed.

The perfected process will provide far-reaching advantages in the extraction of all types of sugar from cane and beet, fruit and corn, while less costly equipment is required by beet sugar producers.

Application of the development leaves them with an edible syrup by-product instead of the usual blackstrap molasses containing quantities of potassium salts. In addition, residue removing problems are eliminated. Cane refining operations with the plastics result in a reduction of about 66 per cent. in the molasses by-product.

TO AUTHORS

FOOD MANUFACTURE is prepared to consider the publication of any books on scientific and technical subjects which authors might care to submit.

Food Problems in the Colonies

SPECIALLY CONTRIBUTED

In an era of ration books and empty shop windows we may at times envy our less highly civilised brothers in far-away lands. The life of the dusky skinned savage who reclines on the sand and regales himself with the fruits of the earth, while listening to the sea breezes sighing through the shady leaves of the coconut palm, has much to commend it. But the authorities would have us understand that this idealised picture is seldom true to life. This article discusses some of the problems facing those occupied with nutritional status in the different colonies and the suggested methods for their solution.

MALNUTRITION is reported to be rampant in many sections of the population of 66 millions which inhabits our Colonial Empire. Any temporary stringency or "austerity" which prevails in this country should serve only to incite our sympathy for our fellow creatures overseas, who often spend their whole lives in a far worse plight than ours.

From the first, however, we must realise that just as the climatic conditions in the Empire range from extreme cold to intense heat, so will the nutritional problems vary from place to place. The difficulties to be faced in the foetid swamps of equatorial Africa, for example, will be quite different from those in the wind-swept Falkland Islands, where the human population is greatly outnumbered by sheep. In the spacious uplands of Nyasaland the sparse human population will secure its food through channels much simpler than those necessary for feeding the seething mass of humanity which is concentrated at Hong-Kong.

General Problems

Perhaps the most vital question to be decided in planning the economic and agricultural policy of the colonies is the correct balance between "cash" crops, grown for export, and "home" crops, grown to provide food for the local inhabitants. As Colonel Walter Elliot has pointed out, at a recent meeting of The Nutrition Society, there are two benefits of modern civilisation, motor transport and the cinema, for which people throughout the world seem willing to pay almost any price. One might add clothing, implements, bicycles, wireless sets, and all the host of manufactured articles which have been substituted for the strings of beads of bygone centuries. The danger is that these imports may be bought at the expense of using for "cash" crops labour and ground which could otherwise produce food for home consumption.

Clearly, however, the progress of commerce in backward colonies cannot be universally condemned as a process by which the coloured man labours for a pittance while the white man pockets the profits. The effects of good administration, sound agricultural policy, and plans for irrigation, drainage, and forestry must always tend to raise the standard of living for all concerned. The problem is to obtain really reliable information as to how serious the incidence of malnutrition has become in the colonies. If necessary we must then proceed to portion out the blame for malnutrition between the impact of civilisation and the unsound food habits of the natives as they were before civilisation came.

The Study of Nutritional Status

Surveys to find out whether or not a population is suffering from malnutrition may be carried out in three main ways, each of which may be varied in detail according to circumstances and the qualifications of the investigator. The first method involves the medical examination of large groups of subjects. The doctor making the inspection will be guided by the general appearance of the subject, his body-weight, and muscular tone. He will pay particular attention to the skin, looking out for the symmetrical bronzing which indicates pellagra, or the horny papules which are sometimes associated with deficiency of vitamin A. Sores at the corner of the mouth will suggest deficiency of riboflavin, bleeding gums will raise at least a suspicion that the vitamin C intake is inadequate.

The second method depends on biochemical estimations, and is often combined with the first method. Instead of looking for the bodily injuries resulting from malnutrition the investigator studies the levels of the various food principles in the blood plasma or urine of the selected subjects. This method has been used extensively in Europe, but hitherto difficulties in the supply of apparatus and chemicals have prevented its full exploitation in the colonies.

The third method is that of dietary survey, in which attention is focused on the quantity and quality of the food eaten rather than on the state

of health of the individuals who are eating it. Very often the first and third methods are combined. The amount of organisation and labour necessary for an accurate dietary survey, however, is much greater than that demanded for the collection of useful information by medical examination.

The nutritional status in various colonies has been studied by many workers, including Dr. H. S. Stannus in Africa and Dr. L. Nicholls in Ceylon. Recently Dr. B. S. Platt, head of the Medical Research Council's Human Nutrition Unit, has made colonial nutrition his special responsibility and has taken active steps to recognise and alleviate malnutrition in different parts of the Empire.

Evidence of Malnutrition

Well-known deficiency diseases such as xerophthalmia due to lack of vitamin A, beri-beri due to lack of vitamin B_1, and pellagra due in part to lack of nicotinic acid all take their toll in various parts of the colonies. A growing weight of opinion, however, suggests that these affections represent only the fringe of the problem. Probably there are many more deficiency diseases of which the cause and symptoms have not yet been clearly recognised and described. The condition of "malignant malnutrition," reported by Trowell and others in Uganda, may serve as an example under this heading. Natives suffering from this disease show a fading of their healthy ebony colour to a reddish brown, combined with loss of bodyweight, liver injuries, and other symptoms, which often end fatally. The illness appears to be due to malnutrition, because it can sometimes be cured by prolonged nursing on a good diet, although dosing with separate vitamins is only partially successful. Here, therefore, we have evidence that a well-characterised set of symptoms may be due to malnutrition, although we cannot as yet name the missing food principles.

As a further complication the experience of doctors engaged in examining groups of natives, particularly troops, has indicated that malnutrition may exist, particularly in its early stages, without any obvious physical signs. The symptoms, while obvious to the observer on the spot, are somewhat elusive and difficult to describe in precise scientific terminology. Army medical officers in the Gold Coast during the war, however, noticed that poorly nourished recruits were not only easily fatigued when made to work but showed a mental condition known as "bloody-mindedness," which apparently consisted of a strong antipathy to discipline. Even more serious was the liability of the recruits to infection with tuberculosis. Both these disabilities were corrected when European rations were given. It is important, therefore, not only to the humanitarian but also to the employer of native labour that steps should be taken to keep the standards of nutrition in the colonies at an adequate level.

Native Food Customs

For administrative purposes the food requirements of the African native are often modestly reckoned as 1 lb. maize and ½ lb. beans daily. In different tribes, however, the dietary habits will depend not only on the foodstuffs immediately available but on the social and religious customs of the tribe. Dr. Platt has commented on the enormous wastage of time and labour involved in some native methods of collecting and preparing food. The entire female population may devote several hours each day to combing the countryside in search of edible plants, to fetching water over long distances, or to laboriously pounding grain with primitive mallets. Efforts at agriculture may be handicapped by lack of efficient implements and manures. The return for the labour expended will depend, moreover, on the crop selected. Thus the cassava plant, from which tapioca is obtained, holds pride of place for giving the most calories per hour spent in its cultivation, although it is a poor food in regard to protein and most of the vitamins.

In many parts of the colonies meat and dairy products are eaten only in small amounts and are often completely omitted from the diet. While the supply of animal foods is relatively good in essentially pastoral areas, such as Nyasaland, faulty animal husbandry detracts from the world of plenty which might otherwise be realised. The pastures are usually made to carry unduly large numbers of stock, possibly with a view to compensating for casualties due to disease. The resulting undernutrition is aggravated by periodical scarcities in fodder supplies, which are often occasioned by drought. In many districts the necessity of employing buffaloes for haulage purposes leads to the production of strong working types in which meat and milk production are given only secondary consideration.

Unusual Foods

In addition to the somewhat monotonous staple components of their diet many native populations enjoy seasonal "extras," which are considered by Stannus to have more importance than is generally realised in bridging the gap between an inadequate and a complete diet. African natives may find both profit and adventure in occasional fishing expeditions, and their catch often finds its way to surprising distances from the sea or river in which it was caught. Berries and fruits are enjoyed as they ripen, and wild honey is always a welcome find. Other "delicacies" may have less appeal to the civilised palate and imagination. Thus caterpillars and grasshoppers may be eaten without the formality of cooking, and swarms of small flies may be pressed together to form slabs. With the inclusion of many less picturesque victuals the variety of native foods is actually quite wide, and Dr. Platt has collected a list giving the nutritive values of several hundred items.

Native efforts at brewing may also make an important contribution to nutrition. Kaffir beer, brewed from a concoction of maize meal, makes no pretence at the sparkling clarity which is considered so desirable in more highly civilised products. The yeasts responsible for the fermentation are not removed but form part of the beverage as it is drunk. Apart from enjoying the alcohol in his beer, therefore, the native benefits by receiving, particularly in the suspended solids, a rich source of just those vitamins which are deficient in a diet consisting largely of maize.

The Impact of Civilisation

Although, as already mentioned, recruits in the Gold Coast benefited considerably when given a diet of European type, the effects of civilisation are not always so fortunate. The high incidence of malnutrition in certain colonial prisons has shown that when attempts are made to feed the natives with their own foodstuffs the results are often disastrous. The frequent observation that prisoners kept in gaols near their homes remain in better health than those brought to prison from long distances presumably supplies the key to the problem. The prisoners' relatives are usually allowed to bring them extra food, and if they live near enough to avail themselves of this privilege they can supply those unconsidered additional items to which Stannus attaches such importance. Another unfortunate repercussion of civilised administration arose in attempts to prohibit the brewing of Kaffir beer, which resulted in the prompt appearance of deficiency diseases. Malnutrition on a much larger scale, however, occurred during the war years in Ceylon. The substitution of part of the rice supply by wheat flour and coconut resulted in substantial increases in the death and neo-natal mortality rates and in the incidence of skin diseases attributable to deficiency of vitamins.

As already indicated, over-development of "cash" crops is yet another consequence of civilisation which may depress the nutritive standards of native populations. The bad effects of over-specialisation have been felt heavily by the coloured inhabitants of the West Indies, where the one-sided production of sugar or bananas has led to prosperity only so long as a good external market has existed for these products. Enlightened agricultural advisers, inspired by Dr. Platt, are now trying to enforce a policy which will ensure that a reasonable proportion of the available ground is devoted to the production of green vegetables and other crops which will provide more adequate food for the large and ever-increasing population of these islands. An ingenious project by which crude molasses obtained as a by-product in the sugar industry is used for the production of edible forms of yeast may also help considerably in the struggle against malnutrition.

It would appear, therefore, that civilised standards of nutrition are usually superior to native ones. Any partial change of native diets, however, whether by the omission of certain essentials or by the adoption of the cheap European foodstuffs, such as sugar and white flour, may only tend to worsen the situation. A half-civilised diet, like a half-civilised native, is inclined to include the bad points from both sides. With these considerations in mind the nutrition expert desirous of improving native diets will be wise to think twice before disturbing intricate "food patterns" which may well have existed for centuries. Moreover, as Sir Joseph Barcroft has pointed out, it has been the fate of the mass of humanity to be underfed since times immemorial, and the injudicious augmentation of food supplies for backward races may only lead to larger populations, still underfed, which will afford ready material for yet another world war.

Future Progress

What, therefore, can the nutritionist hope to achieve in the colonies? The first requirement is for better knowledge of native diets. Dr. Platt has indicated that about 75 per cent. of the money available for improving colonial nutrition will have to be spent on *personnel* prepared to go abroad and work wherever they are wanted. Field parties are already being organised, each including a doctor, an agronomist, an administrator, and a nutritionist. Work in the field, however, will not only increase our knowledge of local conditions but will inevitably provide useful contacts both with colonial administrators and with the natives themselves. Opportunities will therefore be available for "spreading the gospel" of good nutrition based on sound agricultural policy.

Schemes must be evolved to maintain and improve the fertility of the soil. Heavy export crops must not be allowed to impoverish the land, which must be kept in good heart by adequate manuring, cultivation, and irrigation. Where necessary the problem of soil erosion must be countered by afforestation. Disease must be reduced among livestock and improved breeds introduced. Above all, some means such as dehydration must be made widely available in order to preserve food stocks gathered in times of plenty so that they may serve to avert semi-starvation in the leaner periods of the year.

With so much to be done the intelligent co-operation of the native seems essential, and it may well be found that schemes for improved nutrition cannot fully materialise without a parallel drive for improved education and the inculcation of higher standards of social responsibility. Many will agree with Colonel Elliot that while there is sometimes a tendency for problems of colonial nutrition to be viewed from a broad and somewhat romantic angle, the main factor in ensuring real progress will eventually boil down to "day to day plugging away by the administrator on the spot."

Ministry of Food

Latest Statutory Rules and Orders

The list given below is the continuation of the list of Orders published in *Food Manufacture*, May 1, 1946, page. 215.

PRICE FIXATION ORDERS

No.	Date. 1945.	
1668	,, 28.	Mustard Seed (Control and Maximum Prices) Order. Revokes S.R. & O. 1942 No. 2350.
	1946.	
110	Jan. 14.	Order amending the Bread (Control and Maximum Prices) (No. 2) Order, 1943.
125	,, 23.	Canned Fish (Maximum Prices) Order. Revokes S.R. & O. 1943 Nos. 962, 1346; 1944 No. 441; 1945 Nos. 196, 368.
132	,, 24.	Coffee (Maximum Retail Prices) Order. Revokes S.R. & O. 1943 No. 1196; 1945 No. 331.
248	Feb. 19.	Order amending the Green Vegetables Order, 1945, the Home Grown Apples Order, 1945, the Leeks (Maximum Prices) Order, 1943, the Pears Order, 1945, the Root Vegetables Order, 1945, and the Soft Fruit Order, 1945.
325	Mar. 6.	Order amending the Imported Tomatoes (Maximum Prices) Order, 1945, and the Home Grown Tomatoes (Control and Maximum Prices) Order, 1945.

FISH

	1945.	
1567	Dec. 14.	Order amending the Fish (Port Allocation Committees) Order, 1943.

FLOUR

	1946.	
265	Feb. 20.	Order amending the Flour Order, 1945.
312	Mar. 5.	Order amending the Flour Order, 1945.

FRUIT

	1945.	
1551	Dec. 11.	Bananas Order. Revokes S.R. & O. 1940 No. 2063; 1943 No. 5.
	1946.	
133	Jan. 25.	Order amending the Citrus Fruit Order, 1945.
278	Feb. 28.	Canned Fruit and Vegetables Order. Revokes S.R. & O. 1945 Nos. 460, 917, 1262.
347	Mar. 13.	Order amending the Bananas Order, 1945.

KITCHEN WASTE

303	Feb. 27.	(Licensing of Private Collectors) (Extension) Order.

LABELLING

	1945.	
1550	Dec. 10.	Order amending the Labelling of Food (No. 2) Order, 1944.

MILK

	1946.	
191	Feb. 7.	Directions supplementary to the Milk (Control and Maximum Prices) (Great Britain) Order, 1945. Revokes S.R. & O. 1945 No. 1346.

POTATOES

329	Mar. 8.	Order amending the Potatoes (General Provisions) Order, 1944, and the Potatoes (1945 Crop) (No. 2) Order, 1945.

POINTS RATIONING

158	Feb. 1.	Order amending the Food (Points Rationing) Order, 1945. (Anchovies, Canned Fruit, Canned Tomatoes.)
280	,, 26.	Order amending the Food (Points Rationing) Order, 1945.

RATIONING

	1945.	
1527/S59	Dec. 6.	(Fats, Meat, Cheese, Sugar, and Personal Points) (Scotland) Directions.
	1946.	
9	Jan. 3.	Order amending the Sugar and Preserves (Rationing) Order, 1945, the Meat (Rationing) Order, 1945, and the Fats, Cheese, and Tea (Rationing) Order, 1945.
283	Feb. 27.	Fats, Cheese, and Tea (Rationing) Order. (Rations, shredded suet, cooking fats.) Revokes S.R. & O. 1945 Nos. 874, 1143, 1420, 1514; 1946 No. 9.

STANDARDS

157	Jan. 31.	Food Standards (Self-raising Flour) Order. Revokes S.R. & O. 1944 No. 44.

Corrigendum published February 16, 1946.

TRANSPORT

249	Feb. 19.	(Revocation of Transport Provisions) Order. (Sector Scheme and Zoning). Revokes S.R. & O. 1943 No. 1675; 1944 Nos. 300, 473, 1198; 1945 No. 1137.

A sugar mill in Western Canada.

Canadian Beet Sugar

From a small start to large and expanding commercialism—that is a rough way of indicating that the Dominion's sugar-making has come into the category of big business. Years ago the country's sugar was not of the MINCA—the new label indicating "Made in Canada"—brand. Large sums of money had to be sent out to proprietors of sugar mills abroad. Then the Ottawa Government seized the opportunity for tariff protection for home industries, known by the name of "The National Policy."

THE Canadian beet sugar industry had the advantage of being suited to the prevailing conditions in certain sections of the country, but particularly in some of the irrigated areas of Alberta. "If Europe's soil and climate can grow materials in a big way for sugar production so can Canada's." That satisfying argument opened Canadian chequebooks for capital to introduce the industry.

Although it is not claimed that Canada is a better country than England in which to grow sugar beet, it has on the whole not done badly, their average quality being acceptable, though quantity lagged for a war-time year or two, inevitable with less labour on the farms. The figures were 58,350 acres in beet in 1944 as against 82,270 acres in 1940, but with the compensatory advantage of higher yields —608,000 tons of beet in 1944 as compared with 473,000 tons in 1943.

There are four producing provinces—Alberta, Ontario, Quebec, and Manitoba—and recently a suggestion that a factory may be established in Prince Edward Island, whose success in the cultivation of root crops, especially potatoes, seems to point to an opening for the sugar industry if placed under expert direction.

Expansion in suitable areas is encouraged by the Federal Government, with a view to the creation of as much wealth as possible by domestic production. The question is therefore asked, "If 130,000,000 pounds of refined beet sugar in 1943, why not 260,000,000 pounds in 1953?"

That is the trend of current optimism. It is founded on two fundamental conditions: (1) the ability of available markets to absorb the output, and (2) the capacity of suitable land to produce it. The former may be the more difficult of the two, though not impossible. A consideration which cannot be ignored is the all-important economic factor. Obviously, growers must have a satisfactory profit or they will turn over their land to other crops; also reasonable dividends to investors in the highly technical sugar-making processes. As for millions of consumers they quite naturally look for cheap and abundant supplies.

Future sugar production in the world at large may have little bearing on the industry in Canada, which is not likely to be in a position for a long time, if ever, to export this form of food, and the Federal and Provincial Governments may take measures necessary to protect the native industry should it ever be threatened by paralysing outside competition. Primarily, Canada is anxious to meet a growing domestic demand for sugar as far as that is practicable from the country's own resources, as yet only partially developed. Higher wages than in some countries may be offset by Government grants. And there is always a possible tariff on imports as a powerful instrument to aid the home producer.

Sugar mills depend for prosperity upon a variety of individual conditions. The whole subject and general outlook came under detailed review at the

Harvested beet being mechanically stacked.

would seem likely to have favourable consideration.

There being a rather marked tendency to a more diversified cultivation of the land in Western Canada, with resulting smaller commitments to wheat, it is today foreseen that the sugar beet may have increased favour as a profit-yielding crop provided the necessary plants are available for processing and production costs are not too high. It is felt, at least in Alberta, that competition with sugar made in Canadian refineries from the raw material of the Caribbean Islands may be no deterrent to expansion of the all-Canadian industry.

Anglo-Caribbean Conference in the Virgin Islands in March, 1946. A delegate from the B.W.I. pointed out that "sugar production is on the decline in these islands, and we feel that it will become more difficult and less profitable as production is increased in the United States."

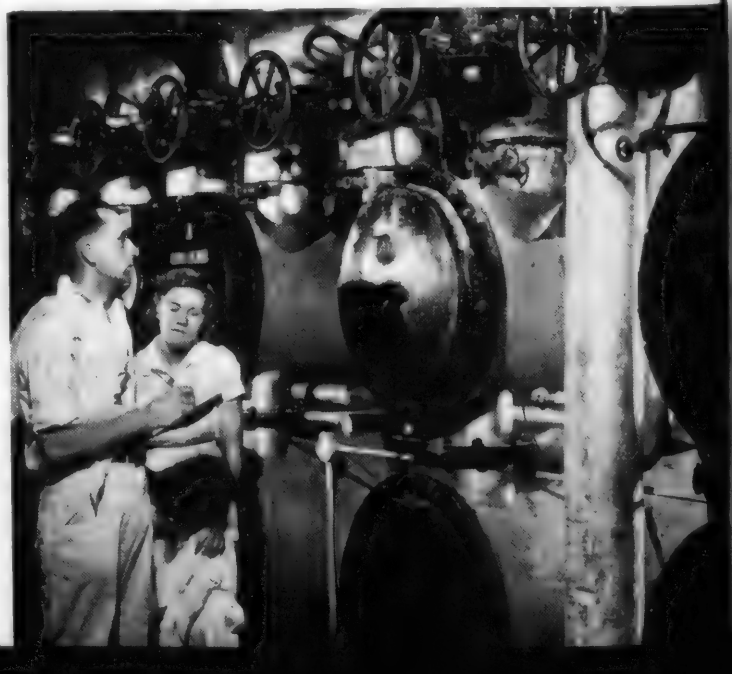
Nevertheless, considering the greater importance of sugar as the years pass, it may continue for quite a time to be "King in the Caribbean."

While discouragements to the importation of refined cane sugar undoubtedly tend to increase domestic production, the industry is also expected by Ontario and Alberta growers to hold its own for the time being, and then gradually expand.

The Sugar Foundation's recent researches have brought out so great a variety of uses both for cane and beet sugar that world output will need to be stepped-up if demands from all sources are to be sufficiently supplied.

At the moment the establishment in the Dominion of more factories appears to be regarded as a wise provision for future food rather than for the use of sugar in the arts and industries. The early construction is planned of another factory in the eastern irrigated district of Alberta at a cost of over £250,000. Under existing legislation a loan from the Government of the Province

The increased cost to Canada of imported raw cane sugar is absorbed by the Sugar Stabilisation Fund built up in past years. Lower insurance and ocean freights in 1946 will partly offset the additional expense, so that the net loss at present prices will be about 30 cents per hundred pounds. The increase in returns to sugar beet farmers this autumn will also be granted without higher prices to consumers. The improvement to growers will be 60 cents per cwt. All of which indicates the favourable attitude of the Canadian authorities in dealing with developments in the beet sugar industry.



Sugar extraction plant capable of dealing with 1,500 tons of beet per day.

Evaporating and Drying by Infra-Red Rays

A description of the fundamental principles of infra-red radiation as applied to an entirely new method of distilling or evaporating liquids and drying solids, with full particulars of standard laboratory units for use in development and small-scale production work.

THE characteristic property of the rays falling within the infra-red range is their tendency to be absorbed rapidly, so producing heat. A further property is their ability to pass through certain materials without becoming absorbed. The Reavell infra-red apparatus introduces an entirely new method of heating and evaporating liquids.

The method relies on the substitution of infra-red radiation for steam as a source of heat, and the substitution of a material which is translucent to the infra-red rays for the ordinary steam-jacketed pan. The infra-red ray passes through the translucent wall and is absorbed by the liquid, whereupon heat is generated. There is, however, no temperature gradient between the source of heat and the liquid itself, and the liquid temperature should be constant. The use of infra-red rays makes it possible to transmit a large amount of heat through a small surface so that the contact time is small—seconds or even fractions of a second.

Description of the Apparatus

A laboratory-size evaporator is now available which embodies the above features and is designed to operate as a film-type evaporator in accordance with the well-known Kestner Climbing Film principles. The application of an electric generator for the production of infra-red rays is here described, but for the larger units gas can in most cases be applied.

Fig. 1 is a diagrammatic arrangement of the system, which may be described as follows:

A is the generator unit containing the evaporation tube into which liquor is fed and in which the actual evaporation takes place. The mixed vapour and liquor pass from the evaporation tube to the separator B in which vapour and liquor are separated. The liquor passes through the liquor pipe C to the concentrate receivers D or D_1. Vapour passes through the vapour tubes E to the condenser F and the condensate passes to the condensate receiving system G.

In addition to the above, there is a vacuum system H whereby any or all of the apparatus can be put under vacuum, and, finally, there is an electrical control system I for controlling energy to the infra-red generator at A.

Ordinary tap water is sufficient for cooling the condensers unless recovery of low boiling-point solvents is required. In this case it can be ice-packed quite easily. Any normal system can be used to produce the vacuum, and at present it has been found that one of the advantages of this apparatus is that a super vacuum is not necessary.

The apparatus is made with glass contact throughout so that the most sensitive liquids can be handled without fear of metallic contamination, and conditions of absolute cleanliness and sterility are easily maintained. Fig. 2 shows the standard laboratory evaporator together with the approximate overall dimensions.

Single and Double Circulation Units

Fig. 2 shows a unit arranged with one generator which gives single circulation of the liquid through the evaporating system. This is quite sufficient for the majority of uses, but in cases where a very high evaporation is required a second generator is supplied containing an evaporation tube with its own separator. The liquor in this case passes in series through the two evaporating tubes and enables a very high degree of evaporation to be reached in a single passage through the apparatus. The arrangement of the second generator and separator is shown in dotted lines on Fig. 1.

The second evaporating tube and generator can always be added to an existing single circulation apparatus as the casing is large enough to take both.

The generator units can be supplied for any normal voltage from single-phase A.C or D.C. supply. The maximum current consumed is 3 amps. for a single circulation unit, and 8 amps. for a double circulation unit when working at 230 volts.

General Performance Details

The degree of concentration will, of course, depend upon the nature of the liquid which is being evaporated, and it can be varied within limits by controlling the rate of flow through the apparatus. To indicate the range available the following table is given to show typical evaporation rates on heat-sensitive liquors at 25° C. to 28° C. evaporating temperatures with a single circulation unit.

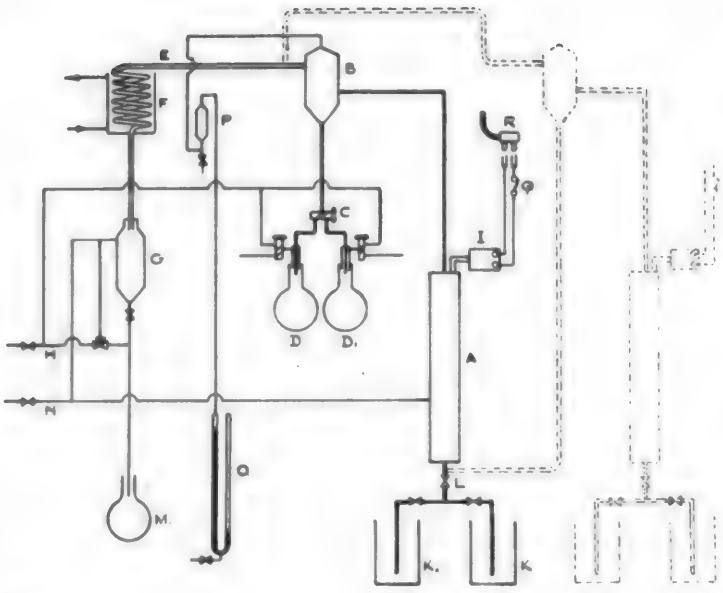


Fig. 1.

TABLE I

Nature of Solvent.	*Rate of Evaporation in CC.s Per Hour.*
Water	500
Alcohol	1,000
Acetone	1,500
Chloroform	2,500

Intermediate rates of evaporation can, of course, be obtained as required by adjustment of the controls. When working with a double circulation unit the rate of evaporation is approximately 50 per cent. greater than that of the single circulation unit.

THE INFRA-RED DRIER

The Reavell Infra-Red Laboratory Drier is an apparatus for carrying out investigations on the drying and evaporation of solid or liquid materials, especially those that are sensitive to heat. It has been designed primarily to enable comparative results to be obtained under different operating conditions and to determine the advantages of infra-red heating as opposed to ordinary convection heating.

Almost all industrial driers make use of hot air or gases to warm up the material that is being dried and so cause evaporation—that is to say, convection heating. It will be seen, therefore, that there are two distinct operations in convection heating:

(1) To heat up the air or gas.
(2) The use of the hot air or gas to heat up the material sufficiently to cause evaporation.

In the Reavell system of infra-red heating this is reduced to one operation, since the first stage is eliminated entirely.

Some Properties of Infra-Red Radiation

Infra-red radiation is one group of a wide range of radiation of electro-magnetic origin. Such radiation is transmitted through a vacuum or through gases as a wave motion and has the properties of waves—*i.e.*, deflection, reflection, interference, and wavelength.

Wavelengths are usually measured in Ångström units or in microns, and 1 micron is equivalent to 10,000 Ångström units. The spectrum begins with the highly penetrating gamma rays of extreme-short wavelength, which are later followed by the hard and soft X-rays. The ultra-violet band begins at a much longer wavelength and is followed by the visible spectrum and, at longer wavelength, by the infra-red spectrum.

The infra-red for convenience is divided into three sub-sections—near, middle, and far. Of still longer wavelength come the wireless waves. The sub-division of the total spectrum with correspondence between Ångström units and microns is shown in Table IV.

In view of the similarity of form, infra-red radiation has properties similar to light and characteristic of all radiations. There are preferred bands of energy associated with different materials which are the result of selected electron transfers in the atomic structure of the material. These bands cause peak emissions from hot materials or peak absorption bands in cold materials. The effect is very well known and their characteristic colours in flames such as sodium—yellow, copper—green, cobalt—red, etc.

The term radiant heat is misleading, as it is possible for all the electro-magnetic spectrum to generate heat as its final form of dispersion. For this heat to be useful it should be available in large quantities and in a form which can be readily absorbed under physically controlled conditions. One property of the infra-red band is that it can be generated in large quantities which are readily absorbed as heat. Other properties are:

(1) Its property of passing through air with little absorption.
(2) Its property of reflecting 95 to 100 per cent. from suitable surfaces.

(3) Its property of immediate absorption in most industrial products of a heterogeneous form.

(4) Its property of selective absorption and transmission from different coloured surfaces varying with wavelength—*e.g.*,

Dark green and red surfaces have a high reflection at 1 micron, a lower reflection at 0·7 micron and 5 microns and a high absorption at 8 to 10 microns.

White has high reflection up to 1 micron with lower reflection and high absorption from 5 to 10 microns.

Yellow has a high reflection over the longer wavelengths up to 10 microns.

In all cases quoted the actual figures taken depend upon the surface characteristics and colour grading. The effect of various wave bands of irradiation on most materials is little known, as the use of radiation in industry is new. It is advised that each material should be investigated on its own merits, depending on its colour, temperature characteristics, etc. Provision is made on the laboratory drier for the use of a range of wavelengths as described.

Evaporation Rate and Liquid Temperature

The theory of vapour pressures is well understood by physicists and no long explanation is required, although a brief reference to the subject may prove useful in explaining a special application of the infra-red drier. If a liquid is subjected to the infra-red ray and allowed to heat up, evaporation will take place slowly until the liquid boils. At this point the temperature of the liquid is a maximum determined by the atmospheric pressure prevailing. The evaporation rate is a maximum, but so also is the temperature. There are, however, certain materials that cannot be heated to the boiling temperature without causing decomposition or spoliation in various ways, and where such liquids must be evaporated it is possible, by using the infra-red drier, to effect quick evaporation at a temperature considerably lower than the boiling point. This is done by subjecting the liquid to the infra-red ray and at the same time blowing over the surface a current of air which can, if required, be warmed up further to increase evaporation rate, and the exact temperature of the liquid can be varied by altering the wavelength of the infra-red generator. In this way liquids that are sensitive to heat and many materials that would be spoiled by contact with high temperatures can be dried and evaporated quickly but without damage.

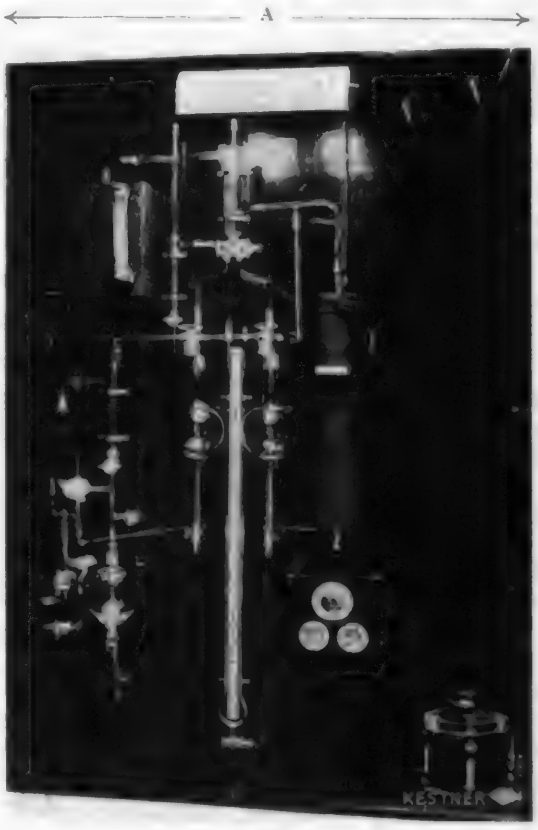
The wavelengths available for the laboratory unit cover the range from 2·4 microns to 3·6 microns in four stages. The effect on the temperature of the evaporating liquid of the various wavelengths is shown by the following examples, taking water as a unit basis:

TABLE II

Evaporation Temperature. (°C.)	*Wavelength of Infra-Red Generator.* (*Microns.*)	*Conditions of Operation.*
100	—	Normal boiling
55	2·4	Evaporation by infra-red radiation.
46	2·8	,,
40	3·2	,,
30	3·6	,,

These figures are all taken at atmospheric pressure.

The temperature reached by the irradiated material depends not only on the wavelength used but also on the intensity of radiation falling on a unit area. The intensity of radiation per unit area generated in the infra-red drier is far greater than can be obtained by the use of infra-red lamps.



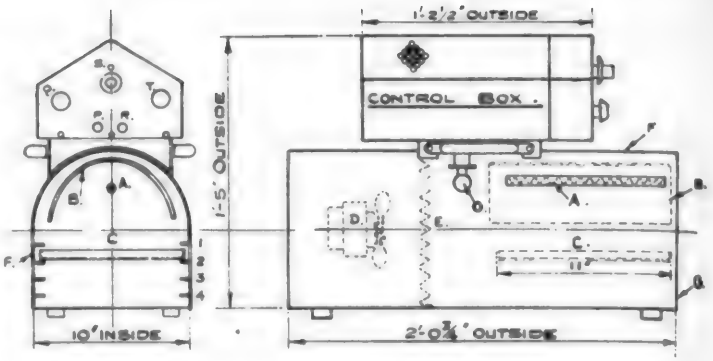
A = 3′ 8″. B = 5′ 4″.

Fig. 2.—Photograph of Single Circulation Laboratory Unit.
Courtesy Kestner Evaporator and Engineering Co., Ltd.

Description of Apparatus

The apparatus comprises a drying and evaporating unit with an external electrical control box. The diagram (Fig. 3) shows the arrangement of the drying and evaporating unit.

Within the main casing F the infra-red generator A is mounted at the focus of a reflector B. A tray rack is fitted beneath so that a parallel beam of infra-red rays will fall above the tray uniformly over its surface. The material to be evaporafed or dried is mounted in the tray C. The movement of air across the trays is caused by a motor-driven axial-flow fan D, and this air can be warmed up by a spirally wound heating element E fitted in front of the fan. A lamp O is placed so that clear observation of the tray can be obtained when the apparatus is running. Access to the tray is gained by swinging open the door G. Where required for special purposes, a sterile filter is provided so that all air passing over the tray is fully sterilised. The control box panel is shown in Fig. 3 mounted above the drier unit. The control for the wavelength of the infra-red generator is graded in microns, and Table IV shows the equivalent value in Ångström units.



A	INFRA RED GENERATOR
B	REFLECTOR
C	TRAY
D	FAN
E	CONVECTION HEATER.
F	MAIN CASING
G	DOOR
O	LAMP
P	I. R. GENERATOR SWITCH
Q	I.R. GENERATOR WAVE LENGTH CONTROL
R	AIR HEATER SWITCH
S	AIR HEATER CONTROL
T	MAIN SWITCH.

CONTROL PANEL

Fig. 3.

Electrical Specification

The following figures are based on an electrical supply pressure of 220 volts:

Infra-red generator—maximum power taken—4·55 amps.
Air heater—maximum power taken—3·75 amps.
Fan motor and lamp—maximum power taken—0·11 amps.
Recommended power supply—10 amps. at 220-230 volts suitable for A.C. supplies only.

General Performance Details

(1) *The Air Heater.*—The maximum air temperature reached when the heater control is full on and the fan running is 58° C., with an ambient air temperature of 15° C. and the electric supply pressure at 220 volts. The temperature can be reduced below this figure, as required, by means of the heater control. It will be understood that these air-temperature figures will vary for different ambient temperatures or for alterations in the supply voltage.

(2) *Drying Rates and Temperatures.*—The rate of drying or evaporating can be varied, as previously explained, by alteration to the wavelength of the generator and/or the temperature of the air blowing over the tray of material and/or the height of the tray. To indicate the range available Table III is given to show maximum and minimum rates of evaporation of water from an open tray at the extremes of air temperature and generator wavelength.

TABLE III

Generator Control Setting.	*Air Heater Setting.*	*Water Evaporated in C.C.s Per Hour.*	*Temperature of Water during Evaporation.*
3·6	OFF	75	30° C.
2·4	OFF	450	57° C.
OFF	2	45	25° C.
OFF	5	100	35° C.

Intermediate evaporation rates and temperatures can be obtained as required by adjustment of the controls.

For high-temperature drying the greatest heat will be obtained by placing the material to be dried in the No. 1 tray position, cutting off the air-blowing fan, and then setting the infra-red generator to 2·4. Under these conditions a maximum tempera-

(*Continued on opposite page*)

Labelling of Medicated Foods and Drinks

FOOD is defined in the Defence (Sale of Food) Regulations, 1943, and the Labelling of Food (No. 2) Order, 1944, as "Any article used as food or drink for human consumption and including any substance which is intended for use in the composition or preparation of food, any flavouring, sweetening matter, or condiment, and any colouring matter intended for use in food," and it is laid down that an article shall not be deemed *not* to be food merely because it is also capable of being used as a medicine. A medicinal or medicated product may therefore be both a food and a medicine.

The fact that a food is recommended as a medicine and must comply with the requirements of the Pharmacy and Medicines Act, 1940, does not make it any the less a food; the true criterion is whether or not it is ordinarily used or intended to be used as a food. Moreover, the payment of purchase tax upon a food as a medicinal or medicated food does not make it the less a food for the purpose of labelling under the Orders.

Foods to which pharmaceutical products have been added, such as infant and invalid foods, cod-liver oil, malt extract, wheat germ, yeast extract in powder form, herb teas, medicated soft drinks, and such alcoholic medicated liquors as require an excise licence for sale, are therefore foods for the purpose of these Orders and, if prepacked, must comply with the requirements of the Labelling of Food (No. 2) Order and include on the label:

(*a*) The name and address of the packer or labeller or of the person to whose instructions or on whose behalf the product is packed (or a registered trade mark, providing that the words "registered trade mark" appear in close proximity to it).
(*b*) The common or usual name of the product (if any).
(*c*) The appropriate designation of each ingredient.
(*d*) A statement of weight or measure.

In the case of all foods, whether or not prepacked, any suggestion in an advertisement or label of the presence of vitamins or minerals must be substantiated by a statement of the amount present in that advertisement or label.

Manufacturers should ensure that the label or description of a product is not misleading as to its nature, substance, or quality and in particular as to its nutritional or dietary value or they will contravene the provisions of the Defence (Sale of Food) Regulations, 1943.

Where a product is formulated on homoeopathic principles, and the medicaments disclosed are present only in minute traces, the Ministry has regarded any disclosure of these ingredients and any claim as to nutritional or dietary value as misleading unless accompanied by a clear and conspicuous indication that the medicaments are of no significance except in homoeopathic practice.

The Ministry is prepared to advise individual manufacturers on their labels if specimens are submitted in triplicate together with a quantitative statement of composition (which will be treated as confidential) to the Standards and Labelling Division, Ministry of Food, 28, Lancaster Gate, London, W.2.

(*Continued from page* 248)

ture of approximately 200° C. will be reached when irradiating on to a non-reflecting surface.

Drying Trays

Since it is intended that the drier should have as much flexibility as possible and should be used for investigations in drying and evaporating any solid or liquid, a single glass sheet is provided which can be slipped into any of the four tray positions. Any suitable tray, dish, or container can then be rested on the glass plate. It is advisable to use as large a tray or dish as possible, and the maximum size that will go in the drier is 11 in. long and 8 in. wide.

The optimum depth of material used in a tray will depend on whether solids or liquids are being handled. In general, liquids can be used up to a depth of 1 or 2 in., but solids should be used in a shallow layer only.

In the course of experimental work it may be desirable to use the drier as an ordinary convection hot-air drier, and for this purpose it is only necessary to switch off the infra-red generator and to utilise the fan and air heater alone. Suitable trays can be mounted in all of the four tray positions, and drying of the material in the trays will take place due to the passage of warm air over the surface.

TABLE IV

WAVELENGTH CHART

Microns.	*Ångström Units.*	*Type.*
$3{\cdot}5 \times 10^{-6}$	$3{\cdot}5 \times 10^{-2}$	Gamma rays begin
$1{\cdot}05 \times 10^{-4}$	1·05	X-rays begin
0·18	1,800	
		— Ultra-violet range
0·38	3,800	
		— Visible range
0·77	7,700	
		— Near infra-red
1·5	15,000	
		— Middle infra-red
3·0	30,000	
		— Far infra-red
15·0	150,000	

Cocoa Production

THE cocoa trade is an essential part of Britain's £36,000,000 annual cocoa, sugar, and confectionery industry. Half of the world's supply of raw cocoa comes from the Gold Coast, sometimes called the Cocoa Colony, where the farms are owned and managed by native farmers.

In the shade of the cacao trees the farmer, armed with his sharp cutlass, cuts the golden yellow pods which grow directly from the stem.

When all the trees are stripped, the pods are slit open and the white pulpy beans scooped out and thrown into baskets.

The beans are then conveyed to a mat of plantain leaves, covered with leaves and left to ferment for six days.

and Research

The fermented beans are spread out on large mats to dry. They have to to be constantly turned, and when thoroughly dry the beans are put into bags ready to be carried to the broker in the next village.

Three cocoa farmers from the bush cross the river bearing the harvested cocoa beans.

The farmers arrive at the broker's warehouse with the beans. After weighing and scrutinisation, the beans are paid for.

The cacao seedlings are a year old when they are planted in the clearings about 10 ft. apart. When they are five years old they come into bearing. After ten years the yield falls slightly, but healthy trees in a well-tended farm continue to bear for twenty years or more.

There is a small harvest during April and May, but the main cocoa harvest begins in October. Each tree bears five or six thousand blooms a year, but the harvest is only about twenty-five pods, each containing thirty to forty beans. When dried the yield of beans from one tree weighs about 2 lb.—enough for 1 lb. of cocoa—the average production of dried cocoa beans being about 1 ton for each farmer, the explanation being that the average size of a cocoa farm is only about 1 acre.

Although there are some 7,000 miles of good motor roads on the Gold Coast, many of the farmers living in remote villages have to head-load their cocoa 20 miles or more down forest trails,

carrying up to 120 lb., before the more modern methods of transport become available.

During the war cultivation suffered from neglect due to the restrictions on trade, and now that conditions are improving in that respect, the industry is faced with a more serious menace in the spread of "swollen-shoot" disease and insect pests.

In order to deal with this problem which, before the war, had reached serious proportions, a Cocoa Research Institute, with headquarters at Tafo, has been established by the Gold Coast Agricultural Department, where a staff of fourteen Europeans and twenty-nine Africans are fighting the disease.

The continuously humid, hot climate of the cacao-growing region of West Africa greatly favours the development of a further disease known as "Black Pod," which is caused by a strain of the fungus *Phytophthora palmivora* Butler. One result of this disease is that the beans in infected pods eventually turn black.

The question whether the disease affects the fat content of this "Black" cacao, and the free fatty acid content of the fat, has recently been investigated by Mr. J. West, Department of Agriculture, Nigeria, in conjunction with the Chemical Section of the Department. The results of two experiments show that the butter-fat content of beans from diseased pods was higher than that of beans from healthy pods taken from the same tree, suggesting that the Black Pod fungus attacks the tissues of the beans but not the butter fat.

Leafless shoots and dead pods remaining on the cacao tree are typical signs of the disease swollen-shoot.

Left: The entrance to the Research Institute at Tafo, Gold Coast.

Below: An example of swollen-shoot being examined by the director.

Top left: Various solutions are added to the soil in which plants are grown experimentally.

Top right: Insects are transferred from diseased to healthy plants in an insectary.

Left: Soil from all parts of West Africa is sent for analysis.

Bottom left: Testing the efficiency of chemical destroyers of parasites.

Bottom right: All specimen leaves are preserved and filed.

Changes in Weight of Vegetables During Scalding

Part II

HAROLD GEOFFREY WAGER

This is the conclusion of the article published in the May issue of FOOD MANUFACTURE.

Water Scalding

DURING water scalding water is taken up freely by the strips, leaching is rapid, soluble solids on the surface of the strips are washed off into the liquor, and as a result the loss of soluble matter is influenced less by the water balance of the raw strips than in steam scalding (see Table 3 and 5). The longer scalding is continued the less effect the initial water balance has on the final wet and dry weights. The following figures for scalding strips of carrot illustrate this. (All figures refer to 1 kg. of raw strip.)

Treatment.	*Duration of Scalding. (Mins.)*	*Wgt. after Wilting or Soaking.*	*Scalded Wgt.*	*Dry Wgt.*	*Soluble Solids in Scalding Liquor.*
Wilt	0	608	765	107	16·5
,,	1	640	820	101	—
,,	3	614	812	97	21·8
,,	10	643	857	93	26·7
Soak	0	1,140	1,000	93	17·1
,,	1	1,152	980	88	—
,,	3	1,170	992	85	27·1
,,	10	1,160	992	84	29·2
Control	3	—	960	92	—
Soluble solids in washing liquor					9·9 g./kg. raw

In this experiment the losses during scalding were closely similar whether wilting or soaking was practised, but there was an added loss in the soaking liquor. The strips were much wilted and in consequence failed to absorb water during scalding up to the level of the weight of the scalded control, but less wilted material does so.

It is clear that, even in water scalding, losses are increased by a preliminary soak or wash, but not to such a great extent as is the case in steam scalding.

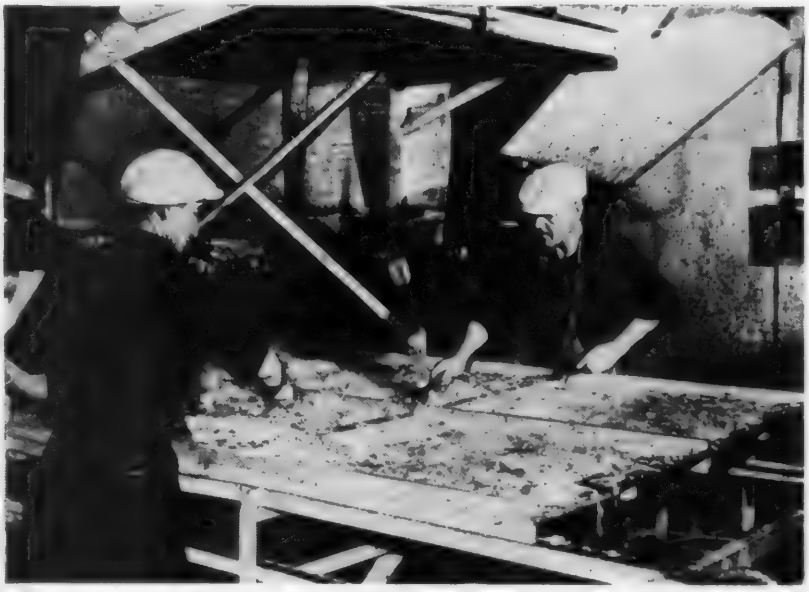
Discussion

Two major conclusions may be drawn from the work described above:

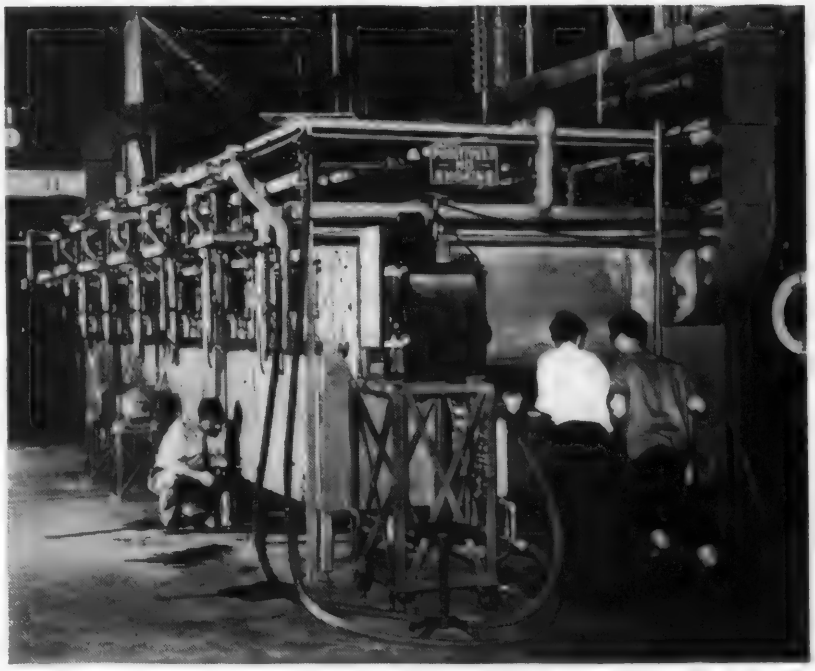
(1) The water content of vegetables scalded in water was only slightly affected by the state of the water balance of the raw vegetables—*i.e.*, whether they were wilted or turgid—provided that changes from the weight as harvested did not exceed 15 to 20 per cent. This is true also when steam scalding is practised, except that wilted material may not attain the weight of the unwilted scalded material because of the small amount of available condensate (15 per cent. of the fresh weight).

(2) The loss of soluble material during steam scalding is mainly dependent on the volume of drip liquor and thus on the water balance of the fresh vegetable. The loss of soluble material in water scalding is largely independent of the water balance of the fresh vegetable.

These generalisations may be explained by supposing that cell walls have a certain natural elasticity which causes the cell, after the removal of os-



Spreading out chopped cabbage before placing in a drying tunnel.



A truckload of pre-treated cabbage is run into a tunnel drier.

motic forces, to have a definite volume. Thus a fully turgid cell shrinks on the destruction of its semi-permeable membrane and liquid with approximately the same soluble matter content as the cell sap exudes. On the other hand, a cell with a water deficit tends to expand when its semi-permeable membrane is destroyed, and in so doing absorbs liquid together with any dissolved material it may contain: thus when wilted material is steam scalded the drip liquor is small in volume and there is little loss of soluble matter. In water scalding the main loss of soluble matter is by diffusion from the tissues after killing, and therefore the effect of changes in the water balance of the raw vegetable is small.

The force causing expansion of cells during scalding is clearly the same that causes "crispness" in cooked vegetables and in the later stages of reconstitution. Overcooking leads to the disintegration of the tissues, but does not necessarily mean that the volume of any given cells changes markedly.

The long continued loss of water and solid matter from vegetables during steam scalding is presumably due, in part, to the slow drainage of the mass of strips and, to a less extent, to the slow rate of movement of fluid through the cell walls under the rather weak forces left after the major part of the wall tension, set up by osmotic force, is released. When vegetables absorb water in steam scalding this, of necessity, ceases abruptly when the vegetables attain the temperature of the surrounding steam and no further condensation occurs. In water scalding the drainage factor is not operative and hence the equilibration is more rapid.

During scalding and draining large batches of cabbage lose and small ones gain weight. This is presumably due to (*a*) an increase in weight during scalding in all batches followed by (*b*) a loss of weight during draining from the larger batches as a result of the squeezing out of liquid from the lower layers by pressure of the upper ones. If this is the case the force of reconstitution (*i.e.*, the expansive force of dead cells) must be small. No measurements have been made with cabbage, but with carrot a force as small as 10 to 20 g. per sq. cm. is sufficient to cause a loss of fluid from scalded tissue.

When the water balance of the raw vegetables is greatly altered, the cells, after scalding, are not the same size as those of the scalded control—*i.e.*, the elasticity of the cell wall is altered by the pre-scalding treatment. In the experiment quoted the carrot strips were wilted to 50 per cent. of the fresh weight, and when scalded did not attain the weight of the unwilted control. Strips made fully turgid often remain after scalding 1 to 2 per cent. heavier than their control. Changes in elasticity of the cell wall may occur also during drying (shown by poor reconstitution of the dried product), especially if drying is prolonged or carried out at an abnormally high temperature. These permanent changes in elasticity only occur under relatively extreme conditions and would not normally be met with in practice.

Culinary Quality and Nutritive Value

The culinary quality of dried carrot or swede, whether prepared by steam scalding the fresh, the wilted, or the soaked strips, was about the same. In different trials differences between the three treatments were recorded, but these were variable in magnitude and inconsistent in direction. Water scalding gave a cooked product less sweet than steam scalding, but no differences were observed corresponding to the pre-scalding treatment.

When cabbage was washed, wilted, dipped into a solution of sulphite, scalded, and dried, a product of poor colour was obtained. The colour was im-

proved if the cabbage was dipped in the sulphite after washing and before wilting, and still further improved if the dip was made alkaline with sodium bicarbonate. A liquor consisting of 0·5 per cent. Na_2SO_3 and 0·5 per cent. $NaHCO_3$ gave rise to a product that was judged equal to the controls in colour, flavour, and texture. The flavour was rather stronger than that of the control and was slightly bitter, but was preferred by some tasters.

The amount of ascorbic acid retained was similar to or slightly better than in normal steam scalding, as shown by the following pairs of figures for different experiments:

Ascorbic Acid Retained after—	
Steam Scalding.	*Wilting and Steam Scalding.*
55	59
54	75
70	66

The culinary quality of strips of potato was the same whether wilted before scalding or not. The only difference was that the strips that had been wilted were somewhat firmer than the normal steam-scalded material. Retention of ascorbic acid was similar in the two cases.

Practical Applications of the Results

By consideration of the physiological state of the raw vegetables it should be possible to estimate the probable loss or gain of water and soluble matter in the various stages of the commercial processing of vegetables for drying.

In general it is clear that when scalding vegetables in steam a water deficit in the raw vegetables is desirable, since this reduces leaching losses to a negligible size. With root vegetables the increase in yield obtained by scalding unwashed and wilted strips compared with the normal washed strips is 15 to 25 per cent. (Tables 3 and 5.) With cabbage, which must be washed, the effect of wilting after washing and dipping in a solution of sulphite is to increase the yield by 5 to 8 per cent. (*i.e.*, by the scalding loss of washed shreds). When scalding in water the use of wilted vegetables would allow the condensate produced in the scalder, due to heating by steam injection, to be absorbed and the serial scald could be made to take place with no leaching loss. This might lead to an increase of as much as 20 per cent. in yield of dried product. Whether such a procedure would be economic would depend on the relative cost of slow drying before scalding compared with the value of the increased yield.

The figures quoted show the large losses which take place when shredded root vegetables are washed, and indicate the undesirable nature of this as a stage in dehydration.

Summary

1. Vegetables with a water deficit increase in weight during scalding.

2. Vegetables which are fully turgid lose large amounts of water during scalding.

3. In steam scalding the loss of dry matter is proportional to the loss of liquid by drip, thus wilted vegetables lose little and washed ones much dry matter.

4. The state of the water balances of raw vegetable as purchased and the changes in weight which are to be expected during scalding are described. An explanation of the observed changes in weight is put forward.

5. The scalding of partially wilted vegetables, as a means of reducing leaching losses to negligible proportions, is proposed.

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The work described above was carried out as part of the programme of the Food Investigation Board. It is published by permission of the Department of Scientific and Industrial Research.

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Elastomeric Engineering

FOR many years rubber has been used by the engineer in applications where its unique properties of flexibility, elasticity, and, above all, its power to absorb high-frequency vibrations and shocks were successfully demonstrated. But in spite of this it is only very recently—in the last few years—that rubber has come to be regarded as a reliable engineering material, capable of being designed to fulfil rigid specifications. It is, in fact, not yet so regarded by the majority of engineers for the good reason that its case and its capabilities have not hitherto been very convincingly and forcefully presented.

The object of the Andre Company's book* is to make this presentation, and it does so most successfully, albeit in a limited field. The book is addressed primarily to the engineering and shipbuilding industries, but it is also of interest and value to the chemical engineer in connexion with the use of various types of natural and synthetic rubber as corrosion- and chemical-resistant materials for lining pipes and vessels and similar applications.

* *Elastomeric Engineering.* London. 2nd ed. 1945. Pp. 168. £1 1s.

A most important technical advance in the evolution of rubber as an engineering material has been the development of the brass-plating and other methods of securely bonding rubber to metal surfaces, and it is mainly this subject and especially its applications which are dealt with.

There are excellently illustrated sections on the general technology of rubber which are necessarily simple and elementary in treatment, since they are not addressed to rubber technologists. In these sections there are a few minor inaccuracies, such as, for example, when it is stated that acetylene is the basic raw material or intermediate in the manufacture of American GR-S rubber, but in general the standard of accuracy is high. There are most interesting chapters on the design, manufacturing control and testing of bonded components, and on the bonding process itself.

Together with the more fundamental *Rubber in Engineering*, published in the series *The Services Rubber Investigations*, by the Ministry of Supply, Admiralty, and Ministry of Aircraft Production, the book should be widely read and studied in many industries, and should find a place in the libraries of all chemical engineers. (*Manufacturing Chemist.*)

Export of Unprocessed Citrus Fruit Juices

In their circular letter of October 19, 1945, Whinney, Smith and Whinney outlined the Ministry of Food's proposals for enabling an early resumption by traders of the export of citrus fruit juices, and allottees have already been placed in a position to export by permission having been given to use for this purpose juice already in stock.

Unnecessary complications in procedure would arise if juice which has already come within the jurisdiction of Allocations Control were to be made available for export purposes except to those holding stocks.

It is probable that a number of transactions will take place by means of transhipment and, as transhipment licences are no longer required for citrus fruit juices, those concerned will therefore be free to make their own arrangements with shippers for supplies without reference to the Ministry. When negotiating with shippers for supplies it should be made clear that resulting orders must not interfere with any quotas which the shippers may have agreed to supply during 1946 under the Ministry's import programme.

As in some cases a trader may wish to import into this country juice for re-export, the Ministry has made allowance in its import programme for a proportion of juice to be used for such transactions. In these instances application should be made to Whinney, Smith and Whinney for permission to retain, free from allocation, the desired quantity of juice. If permission is given, an application for the necessary export licence should then be sent to the Ministry of Food, Fruit Juices, Essential Oils, and Pectin Branch, Portman Court, Portman Square, W.1.

Any trader who wishes to re-export, but who is not in a position to obtain direct quotations from an overseas source of supply, should, before making application, invite offers from accredited agents, and when making his application state by whom the juice will be supplied.

Applications for permission to re-export juice must state the quantity in Imperial gallons, variety, and degree of concentration (if any). While every effort will be made to facilitate the development of export trade, it will be appreciated that home trade requirements must also be safeguarded. Applications will be considered for the re-export of lemon, orange, grapefruit, and lime juice.

As no juice imported for re-export under these terms will come under the jurisdiction of Allocation Control no levy will be payable to the Control in connexion therewith.

The Soft Fruit Industry

Since the beginning of the century the land under soft fruit has declined in acreage. At one time, in England, Scotland, and Wales, there were over 46,000 acres under strawberries, raspberries, and blackcurrants. Today the acreage is about 22,600. The cause of this decline has been found to be related to the poor yields, which, with high labour costs, made the production of the popular soft fruits unattractive.

Research stations, however, being aware of these low yields and suspecting virus diseases, carefully conducted experiments proving that if virus-free stocks were used and precautions taken against virus infection from outside, the plants grew as vigorously as of old and yielded the heavy crops of former days. Furthermore, they continued to remain healthy and the progeny propagated from them were also healthy, provided infection from outside was prevented. It is now accepted generally that virus diseases are the cause of the trouble.

The raising of virus-free stocks is an intricate and difficult process, but as the result of the work done at East Malling, a considerable quantity of such stocks of strawberries and blackcurrants is now available, although supplies of raspberries are still rather limited.

The reconstruction of an efficient soft fruit industry is dependent upon the supply of healthy planting material, and these stocks depend fundamentally on a nucleus supply of virus-free stocks of strawberries, raspberries, and blackcurrants. An expansion of existing schemes is, therefore, most necessary.

Tinplate Substitutes for Food Cans

I—RESEARCH IN U.S.A.

SPECIALLY CONTRIBUTED

The war-time tinplate shortage in the U.S.A. and Germany was considerably greater than it was in this country. This article deals with the research on "substitutes" carried out in the U.S.A.

IN the U.S.A. attention appears to have been directed more to the possibility of using electrolytic tinplate, instead of the usual hot-dip kind, as a means of economising tin, since the former process requires a great deal less tin than the hot-dip method. At the same time some attention has been given also to the use of blackplate, especially when phosphated, at least for the ends of the containers if not also for the bodies. In both directions a good deal of research has been done by the American Can Co. and reported by K. W. Brighton and others.

Hot-Dip Tinplate Substitutes

In an article in *Food in Can*, 1944, **4** (9), 36-40, Brighton says, in dealing with possible hot-dip tinplate substitutes in the post-war period, that foods of 20 per cent. moisture or more require enamel cans if 0·5 per cent. electrolytic tinplate is used; and this will only be competitive with 1·5 per cent. hot-dip plate if corrosion problems are satisfactorily solved, so that the saving realised on tin is not cancelled by the cost of enamel. It is hoped that, eventually, rather thicker electrolytic plating, say, 0·75 to 1 per cent. tin, without enamel, may be satisfactory for packers' cans; but if it goes up to 1 per cent. it does not appear that the saving in tin will be very considerable. The author does not think the bonderised (phosphated) blackplate will be able to compete with tinplate in general lines for packers' cans. The same writer, in a subsequent article in *Iron and Steel Engineering*, 1945, **22** (8), 37-39, expressed the view that the outlook for electrolytic tinplate is somewhat uncertain owing to the present wide variations in corrosion resistance of that type of plating, and if this uncertainty and variation continue it is not likely that electrolytic tinplate will find much favour for processed cans without enamel. Its future in this field depends on consistent production of highly resistant plate.

Lück and Brighton (*Ind. Eng. Chem.*, 1944, **36**, 532-540), in a paper on metallic substitutes for hot-dip plate, said that can manufacturers in the U.S.A., anticipating a tin shortage, decreased the tin weight per base box from 1·50 to 1·25 pound and introduced some new processes. The usefulness of the two substitutes—0·5 per cent. electrolytic tinplate and bonderised blackplate—was investigated, and it was found that the latter is satisfactory for the ends of cans to contain relatively non-corrosive products such as Lima beans, peas, corn, meats, and some marine foods, thus agreeing generally with experience in this country and in Germany. Enamelled 0·5 electrolytic plate was also satisfactory for the whole cans (ends and bodies) for the same class of foods; but without enamel the 0·5 and 0·75 electrolytic coatings, as at present developed, are unsatisfactory for most foods of high moisture content. Some up-to-date American methods of can manufacture are described.

Avoidance of Corrosion

In a further paper on this subject (*Can. Food Packer*, 1944, **15** (6), 17-23, (7), 18-25), the same authors report on work carried out for nearly two years in the laboratories of the American Can Co. on three types of substitutes: hot-dip with less tin, electrolytic tinplate, and bonderised blackplate. Cans made entirely of electrolytic tinplate and those with hot-dip bodies and electrolytic ends showed localised corrosion and pitting. Fruits normally packed in plain cans (pears, peaches, apricots, apples, and fruit cocktails) cannot be packed in electrolytic cans owing to tendency to discolour and risk of severe localised corrosion at breaks or discontinuities in the enamel film. It is thought that some items in this category, such as pears and cocktail fruits, could be packed in cans with plain hot-dip bodies and enamelled electrolytic ends, where the inhibiting action of tin dissolved from the unenamelled bodies would come into play. A very important factor in all this work, as emphasised also in the paper by Adam and Dickinson and by Hedges and Jordan in their book on Tinplate,* is the composition of the steel in the plate. The American authors found that low phosphorous steel (less than 0·015 per cent.) would be beneficial. In the fruit juice, tomato, and tomato product category, it is considered doubtful if any of the substitute plate can be used with advantage, although enamelled electrolytic could probably be used for ends only if the cans are properly exhausted and not over-filled.

* Reviewed in FOOD MANUFACTURE, 1945, **20**, 404.

Cans for Vegetables

For semi-acid or nearly neutral vegetables (*p*H 5 to 5·5) with strong detinning action, which it is desirable to pack in cans with some plain tin surface to prevent discoloration (green peas and spinach), the composite cans with bonderised steel ends proved as good as or better than those with electrolytic ends, but not with asparagus. They were certainly better than cans with plain hot-dip bodies and enamelled ends. With non-corrosive vegetables all-electrolytic and all-bonderised cans, if enamelled, produced good results.

For marine products electrolytic plate, presumably enamelled, was better than plain hot-dip with less tin; and bonderised plate, owing to the severe atmospheric condition in fish canneries, was not suitable for this line, at all events for salmon. This latter conclusion, however, needs further confirmation in view of the fact that, with the latest improved methods of phosphating, including bonderising, followed by a suitable finish, metal surfaces can be prepared for withstanding the most severe corrosive conditions, and it is hardly likely that fish cannery conditions would prove any exception, including conditions of transport to or from such places as Alaska. For meat and meat products electrolytic tinplate bodies with bonderised blackplate ends proved suitable when enamelled. Soups vary widely in composition, some of them being among the most corrosive in their effect on containers. No very definite results are reported, except that there appeared to be some difference in behaviour of the electrolytic tinplate according to whether an acid or an alkaline bath was used, but this difference, of course, was less marked with enamelled plate.

Phosphating Sheet Metal

A comparatively new development has been carried out by the leading American phosphating firm, the Parker Rust-proof Co., who have, during the past two or three years, taken out several patents for phosphating sheet metal to be afterwards fabricated into cans. The company's principal British patents, some in the name of their associates, the Pyrene Co., Ltd., are Nos. 554348, 554734, 557846, 558792, and 561670, of which the following abridgments are given:

554348. Conv. date 17.2.41, U.S. Phosphating ferrous sheets for fabricating into cans, omitting or removing the coat from parts to be joined——*e.g.*, by soldering. Coating must be harder and thinner than usual to withstand shaping and forming operations. They must withstand the finger-nail scratch test. The bath is prepared by dissolving zinc oxide in phosphoric and nitric acids with addition of sodium chlorate and metal carbonate; or by dissolving zinc oxide in phosphoric acid to which is added sodium-*m*-nitrobenzene (sulphonated) and sodium hydroxide; precleaning with naphtha or kerosene.

554734. 2.2.43. Phosphating sheets to be fabricated. These are previously galvanised (zinc-coated) for which certain advantages are claimed, and the phosphate coating, reacting to some degree with the zinc, is very thin and compact and only requires about 15 sec. to produce at a temperature of 135° F., while the galvanising takes 30 sec. Process is accelerated by addition of nitrate, also by use of resilient rollers, which at the same time improve quality of coating. The usual chrome rinsing follows and/or baking up to 600° F. for 3 min.

557846. 8.12.43. Zinc phosphating is again used plus a special accelerator in the form of chlorate plus nitrate, which is said to be particularly efficient, especially if copper also is included. Time required is about 1 min., considerably reduced by use of resilient rollers. Here, too, a very thin coating of zinc, cadmium, or other metal may be first applied. The specification covers other coatings than phosphate.

558792. 21.1.44. This covers chromating instead of phosphating, the former being desirable for various purposes, especially in the case of metal sheets to be fabricated. Bonding film is required as described in Eng. pat. 534852 to increase wettability.

561670. (Addn. to 561504.) Special feature in both cases is use of resilient rollers, particularly suitable for sheet metal to be fabricated. Extremely thin and finely crystalline coatings may be formed. Other solutions than phosphating can be so applied.

(*To be concluded*)

Processed Food Exports

As the Minister of Food announced in the House of Commons on April 16, the Government have decided that exports of processed foodstuffs containing ingredients in short supply must be severely restricted until further notice. They consider that in the present difficult world food situation the general continuance of such exports would not be justified.

The Government's decision does not affect a number of processed foodstuffs which do not contain scarce ingredients in appreciable quantities. These are indicated in Group A of the list given below. Most of them are already being exported and in such cases exports will continue. Export licences are required for all but a few foods, however, and applications for such licences (which should be sent to the Export Licensing Branch, Board of Trade, 4, Fenchurch Avenue, E.C.3) will be considered in the light of the current supply position for each commodity.

Processed foodstuffs subject to allocation by the Combined Food Board are also not affected by the Government's decision. Exports of these foods, which are indicated in Group C, will be permitted only in so far as the United Kingdom has been nominated as the supplier of importing countries.

Processed foods the export of which will be restricted by the Government's decision are indicated in Group B. Until further notice no more export licences will be granted for these except within programmes of requirements which have been notified to the United Kingdom Government by the Governments of Colonies and other Empire countries and also of certain Middle East countries.

The Minister of Food appreciates that food manufacturers and exporters will be disappointed by this decision and that inconvenience will be caused to them, especially since they were recently offered prospects of a definite expansion of export trade, and in many cases were provided with allocations of raw materials expressly for that purpose. He regrets, however, that this restriction of exports has become unavoidable in consequence of the deterioration of the world food situation.

The Minister also realises that in some cases firm commitments have been entered into by traders with overseas buyers. He cannot undertake to allow such commitments to be met in all cases, especially when this would involve a prolonged continuance of exports. But he is prepared to consider special cases sympathetically. Commodity Divisions of the Ministry have been instructed to look into this matter in consultation with their trades and to make such concessions as are reasonably practicable, within the limits of the Government's decision, in respect of firm commitments entered into in the first few weeks of this year.

Traders are warned that the ban on the exports of foodstuffs by parcel post will continue and will be applied without exception.

GROUP A

(Unaffected by Revised Export Policy)

Baking powders.
Casings.
Chicory.
Chocolate couverture (unsweetened).
Cocoa: Butter, cake, powder.
Coffee: Roasted and ground, preparations, essences.
Date spread.
Essential oils.
Fish: Cured herrings, processed herrings, sprats, and pilchards (not canned).
Fish paste.
Flavouring compounds (unsweetened).
Flavouring essences.
Fruit juices (unsweetened, in bulk).
Fruit pulp for jam manufacture.
Gin.
Gravy salts and powders.
Herbs (culinary).
Jams and marmalade (not sweetened with sugar).
Infant and invalid foods.
Isinglass.
Lactose.
Lecithin.
Liqueurs.
Malt extracts.
Medicated sweets.
Mustard.
Pectin and pomace (apple).
Pickles and sauces (other than salad creams and mayonnaise).
Processed nuts.
Preservatives, colouring, and foam liquids.
Rennet, including junket and rennet powders.
Saccharin.
Salt.
Soft drinks (unsweetened or sweetened with saccharin).
Soup powders.
Spices (except cinnamon, mace, nutmeg and pepper).
Stuffings and seasonings.
Vegetables and potatoes (dehydrated).
Vegetables (except beans), canned.
Vinegar (other than malt vinegar).
Whisky.
Wines.
Yeast.
Yeast extracts.

GROUP B

(Restricted by Revised Export Policy)

Bakers' sundries and prepared materials.
Beans (canned).
Beer.
Biscuits and cabin bread.
Cake.
Caramel.
Cereal products: Flour, breakfast cereals, cereal filler, patent barley, pearl barley, oat products, macaroni, etc., semolina, etc.
Chocolate and sugar confectionery.
Cider and perry.
Flour mixtures.
Fruit (canned).
Fruit curd.
Glucose.
Ice cream powder.
Jams and marmalade (sweetened with sugar).
Meat products: Paste, sausages, open packs, etc.
Meat extracts.
Mincemeat.
Salad creams and mayonnaise.
Soft drinks (sweetened).
Soups and spaghetti (canned).
Starch food powders.
Syrup and treacle.
Table jellies.
Vinegar (malt).
Xmas puddings and canned puddings.

GROUP C

(Unaffected by Revised Export Policy but Exportable only under Combined Food Board Allocations)

Dairy products: Butter, cheese, processed milk (evaporated dried whole, sweetened condensed, roller skim, and spray skim).
Fats and Oils: All fats and oils (including shortening and margarine).
Fish: Salted cod, haddock, cuck, pollock, saithe, and ling; canned fish.
Dried fruits: Dates, figs, apples, apricots, raisins and currants, peaches, pears, and prunes.
Processed meat: Pickled, salted, smoked, canned, and dehydrated.
Dry pulses: Dry beans, peas, and lentils.
Spices: Cinnamon quills, mace, nutmeg, and pepper.
Sugar and molasses.
Tea.

New Sweetmeats from Dried Fruits

M. INGRAM, O. de ROUSSET HALL, A. C. HULME

Low Temperature Station for Research in Biochemistry and Biophysics, University of Cambridge, and Department of Scientific and Industrial Research

Ditton Laboratory, Department of Scientific and Industrial Research

The range of possible dried fruit products has recently been enlarged by improvements in the technique of drying fruit. Not only is it possible to produce, from English fruits, dried fruit of superior quality for the normal uses, but a technique for drying to low water-contents has yielded attractive new sweetmeats in the form of fruit nuggets and fruit powders; and, in particular, greatly improved fruit bars can now be made.

FRUIT bars and similar preparations containing nuts and other flavouring substances have become well established in the trade as a delicacy. More recently mixed fruit bars have been considered as components of emergency rations and as flying rations, for although their nutritive value is not specially high they are very palatable, being the only dry product with an acid flavour apart from boiled sweets, and having an agreeable texture when chewed. These properties are of particular value for flying rations, as tests have shown that the full flavour is enhanced when the fruit is eaten at low temperatures, and the texture is an excellent foil to such items as chocolate and biscuits.

Previously the choice of components for such bars has been limited to imported dried fruits such as apricots, sultanas, and prunes. A wide range of fruit bars had been made commercially with these materials, but several disadvantages were obvious. In the first place the flavour of the crudely dried fruits is a poor representation of their fresh counterparts, and it deteriorates quickly on storage because of the high water content. Secondly, much of this imported fruit has a high sulphur content which detracts from the palatability of the fruit bar when it is eaten dry. Thirdly, as such fruit bars are relatively moist they tend to dry out and become hard and tough; this is a particular disadvantage in mixed dry rations, where the overall relative humidity of the pack is low, for it leads to rapid drying out of the fruit, while the moisture is transferred to other components of the pack many of which deteriorate more rapidly as a result.

These disadvantages being inherent in the dried fruits themselves, it was evident that better fruit bars could only be made on the basis of improved dry fruits, the requirements being low moisture content coupled with good flavour and texture. Appropriate new forms of dried fruit have been prepared, and they will be described before proceeding to an account of their use in fruit bars.

NEW FORMS OF DRIED FRUIT

1. English Dehydrated Fruit

It has been found in the Ditton Laboratory that if fruit is dehydrated in a cabinet drier (Fig. 1) a water content of 15 to 20 per cent. can be attained without difficulty; plums, for instance, have been treated for about twenty-four hours, at a temperature of 65° C., with an air speed of 5 ft./sec. through the trays and a tray loading of 5 lb./sq. ft. This water content is similar to that of the imported dried fruits, and the new products are likewise plastic and rehydrate readily, but they are of high grade and retain in full the colour and fruity flavour of the fresh materials. Experimental batches of dried apples, pears, and several varieties of plums have been prepared like this in cabinet driers, while soft fruits have been dried in similar smaller-scale experiments.

At this moisture content the fruit is just dry enough to prevent spoilage by microbes, but the loss of flavour after three to six months' storage at normal temperatures is appreciable, especially as the initial quality is so high. This change is analogous to that in the imported fruits and can similarly be diminished by treatment before drying to give a relatively high content of sulphur dioxide. For use in fruit bars, however, this proved to be undesirable, for the flavour of sulphur dioxide masked the full natural flavour which is such an attractive feature of these high quality English dehydrated fruits.

2. Dried Fruit of Low Moisture Content

As an alternative method of preservation the amount of sulphuring required can be greatly reduced if the fruit is dried to a lower moisture content. There are, however, two difficulties: the last traces of water are not easily removed, and the fruit becomes hard.

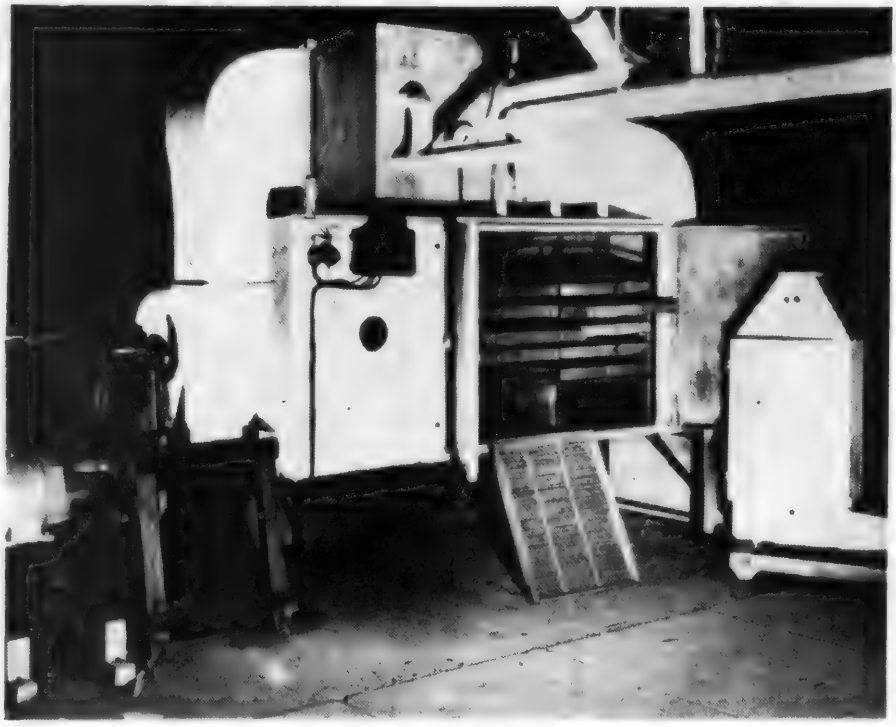


Fig. 1.—The experimental cabinet drier used in preparing English dried fruits. The air flow is horizontal over the racks of trays. The finishing bin is on the right.

(Crown Copyright Reserved.)

Under the conditions of cabinet drying, such as those specified above, removal of moisture below 15 per cent. is very slow. At this stage the sugary juices of the fruit are in high concentration, and, particularly in the case of plums, the fruit becomes case-hardened while the inner tissues remain relatively moist. Case-hardening occurs in plums even if they are stoned and split before dehydration, but it does not occur to a comparable extent when apples and pears are dried, possibly because they are usually dried in thin slices. Nevertheless the drying even of apples and pears below a moisture content of 10 to 15 per cent. in a cabinet drier is unsatisfactory, for prolonged exposure to the relatively high temperature results in loss of quality.

Other methods have therefore been tried for reducing the moisture content of the partially dried fruit (*i.e.*, that of 15 to 25 per cent. moisture) to a lower level. (*a*) The simplest is the use of a finishing bin (Fig. 1), in which the partially dried fruit is exposed to a more moderate temperature for a lengthy period. Under these conditions the heat deterioration of the fruit is less than with further drying in the cabinet drier, while the slow drying reduces case-hardening by permitting some equilibration of the inner tissues and the surface. The moisture content of plums can be reduced to 8 to 10 per cent. by this method. Dehydration is accelerated if the plums are stoned after removal from the cabinet drier; this can be readily accomplished when the fruit is hot, and the effect of stoning on quality is not serious when carried out at this stage. (*b*) A much superior product is obtained if the partially dried fruit is further dehydrated in a vacuum oven (Fig. 2). This method has the advantage over the use of a finishing bin in being more rapid and efficient. The temperature of the oven (40° to 45° C.) is lower than that of the finishing bin (50° to 60° C.), but the fruit is dried to a moisture content of 8 to 10 per cent. in five to six hours. Drying is accelerated if a tray of anhydrous silica gel is included in the oven, as this counteracts any tendency for moisture to condense on the walls of the oven or suction leads. Although the time of drying is shorter, it has been found that this technique counters case-hardening rather more successfully than the finishing bin process.

The rate of drying is increased considerably if the fruit is minced when it is partially dry. As it is then still plastic it can be extruded from a mincer of the sausage machine type in the form of long strips that are easily handled and have a much higher porosity than the unminced material. Dried pear can be produced in this way with a moisture content as low as 5 per cent., and this is the driest material so far produced on a large scale. The moisture content of plum can be reduced to at least 8 per cent.

Dried Fruit Nuggets.—Such fruit, with a water content of the order of 5 per cent., is hard and brittle. It was found, incidentally, that if the fruit was minced and dried as just described in the form of porous strips of aggregated particles the

dry product was a most attractive sweetmeat. It was crisp and dissolved pleasantly in the mouth, yielding the full fruit flavour. Pear nuggets of this sort were particularly palatable; in the case of plums the rather tart flavour was overcome by adding sugar during the mincing process. A similar apple product has been marketed in the U.S.A., though it is not known whether the same method of manufacture was used.

Powdered Dried Fruits.—These nuggets were, however, useless for fruit bars, for they have a low packing density and will not cohere. This can be overcome by grinding the fruit to a powder; similar products have recently appeared on the American market. Such powders cannot be compressed into bars unless they are treated to raise the moisture content again to about 10 per cent.; but even the compressed bars lack the chewable texture which is one of the most valuable qualities of fruit bars—they are extremely tough and can be rehydrated only with difficulty.

3. The Retention of Plasticity

The crux of the problem is thus to combine a much lower water content with the plasticity typical of partially dried fruit so as to give a chewable product suitable for forming into bars. Investigations have shown that if the fruit is treated with glycerol-sugar mixtures before the final drying it retains the plasticity associated with the material at 15 to 25 per cent. moisture, even when it is very much more dry.

For example, plums partially dried in the cabinet drier were heated in a 50 per cent. aqueous solution of glycerol to which 22 to 25 per cent. sugar was added. The plums partly reconstituted in the solution and could be dried in the vacuum oven in the same way as untreated material. Again it was preferable to mince the product before drying. Plums were dried to a moisture content of 6 per cent. following this treatment and retained their plasticity. They contained about 5 per cent. of glycerol and 2 per cent. of added sugar, and had an equilibrium relative humidity of 0·3. Although they were slightly sticky on the surface after drying this was not noticeable after a short period of keeping. Material of this type was used successfully in the preparation of mixed bars of low moisture content.

As a procedure alternative to that just outlined, fruit bars of moderate moisture content were prepared by mixing the powdered fruit of low moisture content with partially dried minced material that had been treated with a glycerol mixture. In this process glycerol was heated in a steam pan to a temperature of 110° to 120° C., an equal quantity of glucose was dissolved in it, and the partially dried minced fruit was then added. When the fruit had taken up roughly one-quarter of its weight of the glycerol-sugar mixture it was removed and mixed in equal parts with the powdered fruit. The resulting mixture contained about 8 per cent. of water, 6 per cent. of glycerol, and 6 per cent. of added sugar. This process involved less prolonged treatment with the plasticising liquid than the previous one, which reduced the loss of extractives to the plasticising liquid which is one of the disadvantages of these procedures. Alterna-

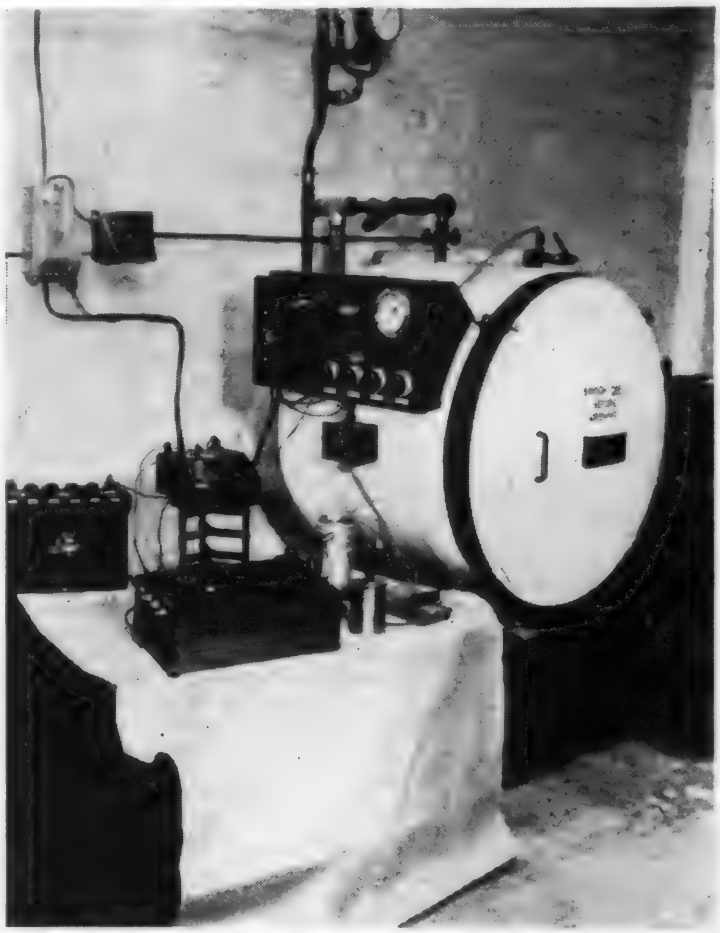


Fig. 2.—The vacuum oven used for preparing dehydrated fruit of low water content. The apparatus on the table is a thermocouple outfit for experimental observation of internal temperature distribution. *(Crown Copyright Reserved.)*

tive processes avoiding this disadvantage are as follows:

If no dry powdered fruit is available, and a moderate degree of dryness will suffice, partially dried minced fruit may be heated with up to one-fifth of its weight of glycerol, which is wholly absorbed. If the heating is prolonged the mixture will be dried accordingly, but a vacuum pan is desirable to avoid browning consequent on the use of too high a temperature. In this way it is possible to produce bars with 20 per cent. glycerol and 10 per cent. water. The large proportion of glycerol keeps the equilibrium relative humidity low (about 0·4), but the bars are rather sticky.

If powdered dried fruit is available the cooking process can be eliminated. Thus to a mixture of equal parts of ground fruit powder and of partially dried minced fruit, 10 per cent. glucose and 10 per cent. glycerol were added warm and well stirred. Little appreciable hardening of the larger particles took place when the mixture equilibrated; and its keeping properties can be assessed from the fact that when wrapped in a high-grade waxed paper the bars were stored for thirty-two weeks at 37° C. without loss of flavour (though some hardening of the surface of the block took place due to drying-out in the very dry hot room—relative humidity 0·25).

The drying of fruit with glycerol is thus the key to the production of fruit bars of high quality. The colour and flavour of the original fruits can be preserved, the large particles and chewable texture of normal dried fruits can be reproduced, and all this goes with a low water content which results in long shelf life even at tropical temperatures. Fruit bars made on this basis are ideal for compact rations.

Summary

This investigation was to find a fruit bar suitable for use in dry emergency rations.

Ordinary dried fruit is too wet (15 to 20 per cent. water) to be used for fruit bars in such rations. It has also poor flavour and usually contains too much sulphur dioxide to be palatable in the dry state.

The colour and flavour are much better if the same moisture content is attained by careful dehydration, but again these properties are not retained on storage unless sulphur dioxide is added.

Greater stability is conferred and sulphur dioxide may be avoided if the fruit is further dehydrated to a much lower moisture content (5 to 8 per cent.). This can, however, only be done slowly by special processing in a bin finisher or preferably a vacuum oven. This final dehydration is facilitated if the partially dried fruit is minced. These very dry fruits are brittle and can be powdered; in either form they are attractive and have commercial possibilities. They are, however, unsuitable for fruit bars.

The essential properties are that the fruit shall be plastic as well as dry. This has been achieved by treating the fruit with mixtures of glycerol and sugar, either before drying or before the final dehydration. Fruits treated in this way can be mixed with dry powdered fruits to give bars of low water content with a variety of textures, in which the fresh colour and flavour of the fruits are preserved even after long storage at tropical temperatures. These bars are ideal for inclusion in dry rations.

*The work described above was carried out as part of the programme of the Food Investigation Board of the Department of Scientific and Industrial Research.**—Crown Copyright Reserved.*

Technology for Butchers

MR. FRANK GERRARD gives a certain fillip to the potential reader of his latest book* when he says that the information he gives in it would have been of value when he first entered the meat industry, and he ought to know, as he has been instructing embryo butchers for many years.

Written for the student as a textbook, and for his preceptor as an *aide-mémoire*, the book nevertheless will appeal to chemists, especially those occupied with the preparation of animal foods. It may also be read with profit by those who believe that the word "education" connotes the knowledge of "something of everything and everything of something."

Mr. Gerrard plunges into matters at the onset of each chapter, and his arrangement is, for the most part, admirable for the purpose of giving a balanced idea of principles.

Chapters giving descriptions of British herds of cattle, sheep, and pigs are illustrated by a fine series of photographs, while others deal with their slaughter. This subject is covered very well in the space allotted to it, especially packing-house methods, which are copiously illustrated. The grading of carcasses of cattle, sheep, and pigs is clearly explained, and this section should be of great help to the student.

The chapter on the preservation of meat is somewhat cursory and might well be written in more detail in a future edition.

The subject of meat cutting naturally forms the longest chapter, and it is treated in a full and practical way, with tables and diagrams galore.

A good index and a useful bibliography round off an excellent bit of work for the purpose for which it is intended.—T. C.-W.

* *Meat Technology*. By Frank Gerrard. Pp. 304. Leonard Hill Ltd., London. 15s. net.

BOOKS RECEIVED

The Chemical Analysis of Foods. By Henry Edward Cox, Ph.D., D.Sc.(Lond.), F.R.I.C.

Turner's Hill Experimental and Research Station. Annual Report, 1944.

Scientific Societies' Meetings

PLAN TO AID PRESS COVERAGE

Scientific societies are co-ordinating their programmes to avoid accidental overlapping of meetings. Recently there have been headaches for the Press in securing adequate coverage of meetings which have been held on the same days and at the same times. Some thirty secretaries of scientific societies met in London on April 9 to discuss methods of ensuring choice of separate dates for individual society meetings. Dr. George L. Riddell, F.R.I.C., Director of Research of the Printing and Allied Trades Research Association, who is chairman of the London and South-Eastern Section of the Royal Institute of Chemistry, and chairman of the Publicity Committee of the Society of Chemical Industry, presided at the meeting. By co-ordinating plans for their meetings, which have increasing interest for the Press in view of the Government sponsorship of a closer tie-in between industrial scientific research and the production drive, these societies hope to ensure better Press coverage of their activities. Dr. Riddell has just been elected a member of the Council of the Royal Institute of Chemistry.

B.E.A. Council Change

At a recent meeting, the Council of the British Engineers' Association unanimously invited Mr. S. F. Steward, Director of E. R. and F. Turner, Ltd., to fill a vacancy on the Council created by the resignation of Mr. F. Ayton, which followed his retirement from active business on March 31.

Mr. Steward is an industrialist who has made an outstanding contribution to the war effort in the service of the State, first as Director of Industrial Electrical Equipment and, on the translation of Sir Percy Mills to the Control Commission for Germany, as Director-General of Machine Tools. Though he has recently relinquished his post as Director-General and is returning to the engineering industry, Mr. Steward has been able to accept the invitation of the Minister of Supply to serve as the first chairman of the newly established Machine Tool Advisory Council.

Starch Allocations Reduced

The Ice Cream Alliance has been informed by the Ministry of Food that owing to a serious deterioration in the starch supply position it has been found necessary to reduce all allocations for ice cream and ice cream powder manufacture for the period March 31 to June 29.

April quotas were released as already allocated, but the quantities for May and June will be reduced by 20 per cent. In effect, this will result in the allocations for the period March 31 to June 29 being cut 13⅓ per cent.

The Ministry of Food has also informed the Alliance that the price of maize cornflour for food manufacturers was increased on April 1 from £30 per ton to £40 per ton, *ex* store.

Appointments

Crompton Parkinson, Ltd., announce that Mr. E. C. Holroyde has been elected Vice-Chairman of the Company.

Mr. Holroyde has been associated with the Company's interests for many years, having been a Director and for some time Chairman of the Australian subsidiary company since 1921. He joined the Board of the parent company in 1932, and for some years was Sales Director and then a Joint Managing Director.

He is a Companion of the Institution of Electrical Engineers, and is at present chairman of the British Electrical and Allied Manufacturers' Association.

*

Captain H. V. Wilkes, R.A., has been appointed manager of the Cardiff branch of J. H. Fenner and Sons, Ltd.

Trade Mission

A Goodwill Trade Mission under the auspices of the Board of Trade has left London for Iraq.

The purpose of this mission will be to encourage interest in the United Kingdom as a source of supply for both capital and consumer goods, and to express the desire of United Kingdom industry to assist the economic progress and development of Iraq. The mission will return via Syria, the Lebanon, and Cyprus.

Lord Davidson has accepted the leadership of this mission, of which the other members will be as follows:

Brigadier-General Sir Godfrey Rhodes.

Mr. Alastair Gibb, a partner in Sir Alexander Gibb and Partners.

Mr. G. L. Wilkinson, representing the T.U.C.

Mr. J. F. Perry, a director and general manager of Metropolitan-Vickers Electrical Export Co., Ltd.

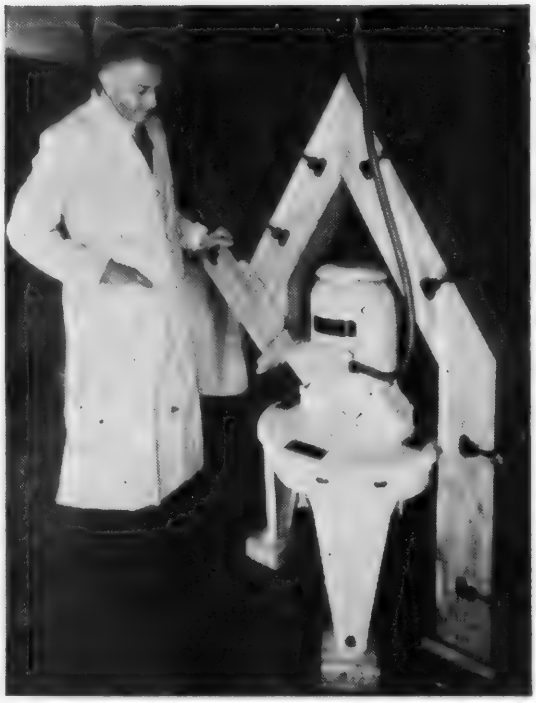
Mr. S. Castle-Smith, a director of Samuel Courtaulds and Co., Ltd.

Music in Factories

In May, 1943, H.M. Government entered into an Agreement with Phonographic Performance, Ltd., by virtue of which the performance of gramophone records, whether by means of turntable equipment or by means of rediffusion of B.B.C. transmissions, could be given in industrial premises without payment of individual licence fees.

Since the expiration of this Agreement on February 24, 1946, organisations proposing to make use of the facilities hitherto available under the Agreement must make application direct for the requisite licence to Phonographic Performance, Ltd.

To avoid any misunderstanding it should be pointed out that when copyright music is publicly performed by means of gramophone records two licences must be secured. Firstly, the licence of The Performing Right Society, Ltd., which controls the copyright in the musical work reproduced on the record and is issued on behalf of the composer; and, secondly, the licence of Phonographic Performance, Ltd., which controls the entirely separate copyright subsisting in the gramophone record and is issued on behalf of the record manufacturers.



A New Method of Pest Control

Arrangements have been made by Henry Simon, Ltd., for the "Entoleter" Infestation Destroyer to be manufactured in England and distributed by them to the milling and food industries throughout the world except the North American continent.

Patented by the Safety Car Heating and Lighting Co., Inc., of America, it is an interesting machine whose application differs from ordinary methods of pest control, such as fumigation, in that it treats the actual products themselves; it operates entirely by centrifugal force without any heat, gas, or chemicals, and it is claimed to give a 100 per cent. kill of mites, eggs, and insects in all stages of growth. It can be used on all dry, free-flowing products such as flour, dehydrated soups, custard powders, spices, etc., and it would appear to have interesting possibilities in flour and provender mills and in food manufacturing plants generally.

The illustration shows the machine installed in the mill owned by Sunvi, Ltd., manufacturers of malt flours and their products, at Wakefield, which is divided into two units, one milling wheat and the other barley.

The Entoleter is installed in the wheat plant and is an H.2 machine of the hopper type with a capacity of 2,000 lb. per hour and is fed from a small redresser. After passing through the Entoleter the malt flour goes straight into a specially designed hopper from which it is directly sacked off.

It is interesting to learn that, besides fulfilling its claim to destroy eggs, mites, larvae, and insects, the machine acts as an efficient final blender and has made a noticeable improvement in the colour and uniformity of the flour.

Flavouring Materials

The distribution of diacetyl and acetyl methyl carbinol has been taken over by Advita, Ltd., from their associates Trufood, Ltd. These flavouring materials are well known in the confectionery and bakery trade and are widely used by compounders of essences.

Diacetyl has a chemical formula $CH_3.CO.CO.CH_3$, and is a bright yellow liquid boiling at 89° C. Its powerful butter aroma makes it a valuable ingredient in confectionery products. When treated with hydroxylamine it yields dimethylglyoxime — the analytical reagent used for the determination of nickel.

Acetyl methyl carbinol (also known as acetoin) has a more subtle aroma reminiscent of peppermint. Its chemical formula is $CH_3.CH(OH).CO.CH_3$, and its boiling point is 148° C.

Advita, Ltd., are also marketing various grades of glyceryl monostearate emulsifiers.

Packaging Research

Intensive packaging research to be undertaken by PATRA in their new laboratories at Leatherhead will include study of the protective qualities of various packaging materials and work to evolve materials which will give greater protection against moisture vapour, liquids, gases, heat, and light. Endeavour will be made to establish the relationship between the shape of the package and its strength and endurance, and to develop more effective methods of package closure, including adhesives and heat sealing.

Work will also be undertaken in PATRA's new laboratories to obtain improved methods of cutting and creasing, and towards securing from packaging machinery the optimum efficiency.

While this long-term research is proceeding, the service of helping members with their day-to-day problems, which has long been an important and helpful part of the work of the Association, will be continued and developed. The reference library and comprehensive collection of information on every phase of technique and technical development, which will be adequately housed in the proposed new building, will similarly be expanded, and frequent publications of *Printing Abstracts* and *Packaging Abstracts* and other information bulletins will be continued.

The Government Department of Scientific and Industrial Research (D.S.I.R.), which is considering now the extent to which it will aid the work by an annual grant, has already indicated its desire that the printing and packaging industries should collaborate by giving increased financial aid.

A very attractive booklet has recently been published, which gives full details of the past work of the Association and its extensive plans for the future.

Higher Appointments

Appointments, the utilisation of training and talent, and the safeguarding of status, pay, and conditions are problems confronting every industrial executive and technician. All of them are dealt with in a booklet issued by the Association of Supervisory Staffs and Engineering Technicians in connexion with the Government White Paper on Higher Appointments.

The Health Congress at Blackpool

The final arrangements have now been made for the Health Congress, which is to be held at Blackpool from June 3 to 7 next by the Royal Sanitary Institute.

The Right Hon. Lord Woolton will be installed as President of the Congress at the Inaugural Meeting on the opening day. On the other four days thirty-eight addresses and papers will be presented. The subjects to be discussed include the following:

- The Social Pathology of Rheumatic Fever.
- The Future of the Special Hospital.
- The Care of Children away from their Parents.
- The Future of Paediatrics.
- The Care of the Aged in Health and Sickness.
- The Allocation of Duties in the Public Health Nursing Service.
- The Nutritive Value of Processed Foods.
- Pathology in its Relation to Meat Inspection.
- The Tuberculin Test and the Control of Bovine Tuberculosis.
- Hygiene of Food Premises.
- Heating and the Community.
- Prefabrication from an Architectural Point of View.
- Road and Traffic Problems.
- The Comparative Value of Certain Sewer Sections.
- Housing and Slum Clearance.
- The Influence of Heat, Light, and Sound on Town Planning and Housing.
- Colour and Form in Landscape Design.

A record number of delegates has been appointed to attend the Health Congress, and it is expected that about 2,000 people will be present.

Food Manufacturing Plant

The design and manufacture of food and chemical plant and the fitting up of food factories, including the erection of structure and the installation of steam-raising plant, are undertaken by John Thompson (Dudley), Ltd., part of the John Thompson Engineering Group. Among a wide range of products are boiling pans, cooking retorts, mixed vessels complete with stirrers and tilting arrangement, digesters, hoppers, pressure vessels of all kinds, heating exchangers, and heating coils.

Dairy and Ice Cream Equipment Association

Discussion on the proposed revised draft of the Rules and Constitution took place at the eighth annual general meeting of the Dairy and Ice Cream Equipment Association held in April, Mr. J. S. Clayton Marshall, President, in the chair. The chairman explained that the sub-committee appointed to deal with this matter had worked very hard in trying to incorporate all the various suggestions that had been made. He read the proposed rules to the meeting, giving the few amendments which had been made by the committee at a meeting held during the morning. No comments being forthcoming from the members the proposition was carried unanimously.

Addressing the meeting, the President mentioned the problems that had arisen during the change from war to peace which were common to everybody. Business executives confront many perplexing problems today, but he firmly believed that in the D.I.C.E. there was an invaluable instrument for organised harmony at all times. An Association made up of many individual parts, yet blended by the friendships formed within their assemblies, could not fail to have a pleasing and beneficial effect on all concerned.

Referring to Mr. Graham Enock's Presidential Address a year ago, Mr. Marshall reminded members of the question he then asked: "Is there any reason why our personal and business relations should not continue to be vastly better than they were before the war, and that the manufacture of dairy plant and equipment and everything else that goes with it should not be a still happier and more friendly industry working on lines of common understanding to a profitable end?" He suggested that when the D.I.C.E. failed to achieve this object its usefulness would no longer exist.

The Dairy Show Exhibitors' Committee, which was brought into being by the Association, although now possessing separate identity, was making very creditable progress. The same remarks also applied to the Educational and Training Scheme, which was born in the D.I.C.E. during Mr. Shepheard's presidency. This work had now been taken over on a much larger scale by the Society of Dairy Technology. Members of the D.I.C.E. are taking a very active part in the good work which these two committees are doing.

Mr. H. A. H. Crowther was unanimously elected President for the coming year and the present Committee was re-elected *en bloc*.

Fifty cocoa nib hoppers in the course of erection in a Midlands factory.
Courtesy John Thompson (Dudley), Ltd.

Potato Starch Production

IMPROVED SEPARATION METHOD

When producing potato starch it is of the greatest importance to separate the starch grains from the fruit liquor and starch flour as quickly as possible.

This separation is mostly carried out by gravity settling, which, however, has a number of disadvantages. It may also be effected by the so-called centrifugal extractors.

The advantages of the centrifugal extractor, but not the drawbacks, are features of the De Laval starch separator, type SDQY 14, especially designed for the purpose. The starch milk flowing from the vibration screen to a collecting vessel is pumped to the separator through a pipe fitted with an extra safety strainer.

In the separator most of the fruit liquor is replaced by fresh water introduced through the spindle to wash the starch concentrate and air removal from the bowl. The starch leaves the separator at a concentration of 30 to 40 per cent. (10° to 13° Bé.) through an open outlet from where it flows to a washing vat. The starch-free fruit liquor (or protein water) is discharged from the separator bowl by means of a built-in pump wheel at the top of the bowl. The fruit liquor can therefore be pumped through a pipe out of the factory so that there is none of the usual annoying frothing inside the building. The losses with the waste water only amount to approximately 0·1 per cent., measured as bottom settlings in a test tube, which is a very low figure compared to current losses from gravity settling apparatus or centrifugal extractors. Further, it should be noted that only the minor part of this loss is starch, the rest being protein matters of about the same weight as the starch itself. If desired, the separated fruit liquor can be brought to an outside settling basin or the like from which the bottom settlings can be periodically recovered.

From the starch separator the concentrate flows into a settling vat for separation and removal of non-starch matters such as fibres and protein substances.

Finally, the pure starch is dewatered in a basket centrifuge or in a rotating filter, and dried by heating, preferably under vacuum.

Further details of the separator are contained in leaflet No. 16234 issued by the Alfa-Laval Co., Ltd.

De Laval separator concentrating and washing potato starch.

B.E.T.R.O. Appointment

Mr. Harold C. Lovell has been appointed to the Contact Staff of B.E.T.R.O. He will concentrate on the food, drink, and tobacco trades.

Changes of Address

E. A. Lund, Ltd., manufacturers of "Table Brand" Foods, have moved to new premises at Shaftesbury House, Lord Nelson Street, South Shields, Co. Durham. Tel.: South Shields 1808-9. Telegraphic address: "Venda" South Shields.

*

The public relations organisation of Hereward Phillips, Ltd., have moved to new premises at Gloucester House, 19, Charing Cross Road, London, W.C.2. Tel.: WHItehall 0841.

*

The London office of George Scott and Son (London), Ltd., and Ernest Scott and Co., Ltd., has moved to 110-120, Chandos House, Palmer Street, Victoria Street, London, S.W.1. Tel.: ABBey 2121-3 (as before).

Sales Managers' Examination

For the first time in nineteen years the Incorporated Sales Managers' Association will conduct its annual examination in six two-and-a-half-hour sessions over a period of three days—June 27, 28, and 29.

The final examination consists of six subjects: Market Research, Marketing, Budgetary Control and Sales Forecasting, Principles and Practice of Salesmanship, Sales Organisation and Control, and Advertising.

Information regarding these examinations can be obtained from the Association, 23, Bedford Square, London, W.C.1.

Committee on Patent Law

PUBLICATION OF SECOND INTERIM REPORT

The Second Interim Report of the Committee appointed by the President of the Board of Trade to enquire into the changes necessary in the Patents and Designs Acts and the practice of the Courts in connexion therewith has now been published. The Report deals mainly with the question of the abuse of monopoly rights in connexion with patents and with the trial and cost of patent actions. Copies of the Report (Cmd. 6789) are obtainable, price 9d. (by post 11d.), through any bookseller or newsagent or direct from H.M. Stationery Office, Kingsway, London, W.C.2.

The Committee are now able to consider proposals for the amendment of the law of patents and designs outside the particular subjects dealt with in the present Report. Any person who wishes to submit suggestions for consideration by the Committee should communicate with the Secretary, The Patents Committee, 1944, 25, Southampton Buildings, London, W.C.2.

Nationalisation of Inland Transport

THE MOTOR INDUSTRY'S VIEWS

In view of the recent declaration by the Prime Minister of the Government's intention to introduce a Bill into Parliament at an early date to nationalise all forms of inland transport, the Society of Motor Manufacturers and Traders, Ltd., has had the implications of this policy under close consideration.

The result of its investigations is to satisfy the Society that any form of nationalisation will be injurious to the transport industry and will not confer equivalent compensating advantages upon the community. The experience to be acquired from the various forms of nationalisation of transport in other countries does not encourage the acceptance of similar conditions in Great Britain. Only proved advances in efficiency and reduced cost could justify the experiment on such a vast scale as would be required, and the risk of failure is so great as to place the nation's trade in jeopardy at a time when every effort is required to develop and expand it.

While no good purpose would be served by going into the many cases, particularly of railway nationalisation, which have been definitely unsuccessful, it is pertinent to state that the nationalised Road Transport Board of Northern Ireland has been a costly failure and that the wartime organisation of road transport in this country was not only not satisfactory from the users' point of view but was put into operation mainly to conserve rubber and petrol. Very little helpful data can be obtained from that experience.

The Society, on behalf of the Motor Industry, calls for clear proof of the advantages not already available upon which the Government rests its case for nationalisation. Such proof as exists tends to show that nationalisation would stifle initiative, remove the wonderful flexibility of road transport, and, in the case of failure, would, by increasing the price of the goods conveyed, place a further burden upon the tax-payer and prejudice both home and export trade.

Marconi Instruments, Ltd.

Pursuing their policy of providing area sales and service facilities on a comprehensive scale, Marconi Instruments, Ltd., have now established an office at 10, Portview Road, Avonmouth, Bristol. Tel.: Avonmouth 438.

Reports from Germany

Further reports submitted by teams of industrial experts, who have visited Germany under the auspices of the Combined Intelligence Objectives Sub-Committee and the British Intelligence Objectives Sub-Committee for the collection of scientific and technical intelligence from German industry, are now available.

Reports, as they are published, will be distributed to the chief Public Libraries, to Universities and to Professional and Scientific Institutions, and to the Trade Associations concerned. A limited number of copies will also be on public sale and may be ordered from the Sales Offices of H.M. Stationery Office.

United Canners

At the fourteenth ordinary general meeting of the company the directors recommended a dividend of 12½ per cent., less income tax.

H.P. Sauce

At the twenty-first annual general meeting of the company the Board proposed to pay a final dividend of 22½ per cent., less tax, and to follow the example of last year by a bonus of 5 per cent., less tax, on the Ordinary shares, making the total dividend for the year 35 per cent.

Secondary Aluminium Alloys

The Latchford Locks (Warrington) Refinery and Powder Works have been acquired by the British Aluminium Company, and the Company is able to offer a full range of secondary aluminium alloys for incorporation in wrought materials and for casting and other purposes.

New Subsidiaries

The Beecham Group has acquired the whole of the issued share capitals of R. W. Holden, Ltd., canners and food manufacturers, and North of England Lard Refiners, Ltd., both of Darwen, Lancs.

The United Glass Bottle Manufacturers, Ltd.

The directors' report and statement of accounts were presented at the thirty-third ordinary general meeting of the United Glass Bottle Manufacturers, Ltd., on April 11, 1946.

The net profit for the year ending December 31, 1945, was £220,666, to which must be added £55,521 brought forward, making a total of £276,187.

After deductions a disposal balance of £137,678 was left, from which the directors recommended the payment of a final dividend on the Ordinary stock of 7½ per cent. (11 per cent. for the year), less tax, and a cash bonus of 2½ per cent., less tax, making £61,436 in all, the balance of £76,242 being carried forward.

Express Dairy

Expansion of the catering side of the business is being undertaken by the Board of the Express Dairy. At the recently held meeting of the company Mr. W. A. Nell noted that the increased profits were entirely the result of the company's restaurants having had another record year of business. The teashops, however, still produce the greater part of sales and net profit derived from the catering section, and it is the company's intention to develop this side of the business as rapidly as conditions permit.

The milk industry is still operated under Government control, with profit margins regulated by the Ministry of Food's continuous costing methods. For the time being, and until the company is able to recommence the sale of cream, milk preparations, and dairy products on a scale commensurate with pre-war days, there is necessarily a restriction of profits from the milk side of the business. It is doubtless partly for this reason that the company is concentrating on catering developments.

Infra-Red for Fish

Norwegian canners have agreed to double the contributions to the industry's research fund.

Technical and mechanical developments aimed at include the treatment of fish by infra-red rays and full automatic treatment of raw material before canning.—*Reuter.*

New Sugar Process

Successful tests of a new sugar process at Manati Sugar Mill, Havana, which may revolutionise the Cuban sugar industry and lower the cost of sugar refinement, have recently been announced.

The process allows refining direct from cane juices of whiter and finer sugar than that obtainable at present.—*Reuter.*

Soya Bean Bread for Africans

A message from Nairobi says it is planned to introduce 10 per cent. soya bean flour into wholemeal loaves for African consumption. The addition will add greatly to their nourishment value and also reduce the price of the bread. Soya beans, now being planted on a large scale in Uganda, will be used for the purpose.

Milk Discovery

Professor Bertrand, of the Pasteur Institute, Paris, has discovered a method of preventing milk from turning in hot weather.

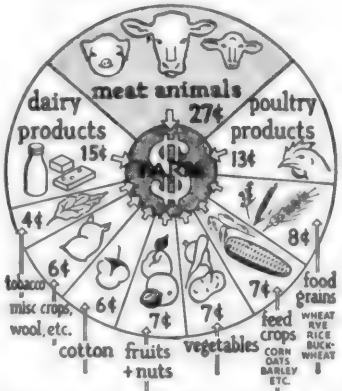
He states that one drop of a colourless liquid called microlysine, which is derived from chloropicrine, will preserve 85 pints of milk without the slightest effect on its flavour or quality.

The Paris public health authorities have made extensive tests with it, and people to whom microlysinised milk has been delivered have reported that it keeps for weeks in exactly the same state as when it arrived.

Food for Britain

Northern Rhodesia has not only hit its £20,000 Food for Britain target, but has overshot it by hundreds of pounds. It is estimated that the final total will be at least £21,000.

Where the FARMER'S 1945 DOLLAR came from



Government payments of about 4% excluded

Source of data: U.S. Dept. of Agriculture

More than one-fourth of American farmer's total cash income in 1945 came from the sale of meat animals, according to the American Meat Institute. Meat packers paid out approximately 5 billion dollars to five million farmers and ranchers. This was approximately 150% greater than the average of the pre-war years of 1935-1939. From their total cash income, livestock producers paid out large amounts for stock, feed, help and increased operating costs.

Machine for Filleting Fish

Atlantic Coast Fisheries has developed a machine that not only fillets cod and haddock but also counts them, according to the *Wall Street Journal.* It is said that the machine saves 18 to 20 per cent. of the edible flesh of the filleted fish.

New Zealand Salt

A yearly production of 50,000 tons of salt from 1,300 acres of mudflats at Lake Grassmere, 80 miles south of Blenheim, is expected when New Zealand inaugurates her newest industry next summer.

Millions of gallons of sea water will be pumped into a series of concentrating ponds, and the production of salt from sea water by the process of evaporation will begin.

The yield will be equivalent to New Zealand's present imports —mainly from Britain and Australia.

Porpoise Hunting

Porpoise hunting is being revived in the Black Sea. Porpoise fat processing factories on the Black Sea coast, ruined by the Germans, are to be restored.

Australian Canned Fruit

The Australian Minister of Commerce has announced that arrangements have been made for the shipment of 900,000 cases of canned apricots, peaches, and pears to Britain from the 1946 crop.

Grape Crushing Machine

A new U.S. grape crushing machine has been patented, whereby the grapes are passed through a loosely adjusted pair of rubber rollers, which break the skins and allow the prime juices to trickle out. These are collected and passed over a chilling coil to remove impurities.

A second set of rollers set somewhat tighter extract second and third grades of juice, while the remaining material is minced and processed for the manufacture of marmalade.

Fishery Development Plan

A five-year plan for fishery development, estimated to cost over 30 million rupees, has been submitted to the Development Board of Sind (North India).

The scheme includes plans for a new marine and fresh water fishery, the establishment of nineteen fish curing yards in Karachi and districts near the Indus, construction of a fishing harbour, and a marine aquarium.—*Reuter.*

Food Production Drive

In a circular announcing a drive by the Gold Coast Government for greater food production, the Colonial Secretary said that the United Kingdom Government has asked the Gold Coast Government to take all possible steps to secure a maximum contribution from the Gold Coast to relieve the present shortage of essential foodstuffs.

Palm oil kernels will be given priority, the circular stated, and the Government will give a price for all surplus food for export.—*Reuter.*

Fresh and Frozen Food Deliveries

A novelty dual-purpose truck body for fresh and frozen food delivered at the same time on the same vehicle is used by the American Booth Fisheries Corporation.

The bodies of these trucks contain two refrigerated compartments, and were designed largely for use on country routes where there is a great demand for both fresh and frozen food merchandise.

The freezer compartment of the truck maintains a temperature range of approximately −10° to +10° F., and the cooler compartment of the truck body carries a standard cooler temperature slightly above freezing point.

The truck body is equipped with a self-contained refrigerating unit, so that it can be connected to an electric circuit in any town where it spends the night. The unit operates during the night, and by morning temperature in both compartments will be lowered to the point where it will satisfactorily preserve the food throughout that day and until the refrigerating machine can again be connected to an electric circuit when the truck puts up for the night. It does not operate when the truck is on the highway.

The freezer compartment is loaded with all types of pre-frozen fish, also quick frozen fruits, vegetables, and poultry; in the cooler compartment fresh oysters and all varieties of fish are loaded.

Fresh and frozen food on the same delivery truck.

New Soviet Industry

Concentrated foods, including porridge, soup, fruit jellies, and lunch dishes, are now being produced by the Soviet food concentrates industry, which aims at producing 1,750,000 lb. per day by 1950.

Ministry Announcements

Preserves Allowance

From April 28 the preserves allowance for bakers and confectioners was increased by 50 per cent. This restores a cut made last autumn and is a continuing allowance and not a bonus issue.

Control of Vitamin C

From April 12, 1946, the Ministry of Food ceased to control the production and distribution of vitamin C (ascorbic acid), and to this end the Vitamin C (Control) Order, 1941, was revoked by an Order dated April 12, 1946.

The Control has been transferred to the Directorate of Medical Supplies of the Ministry of Supply, and from the date mentioned above all enquiries or correspondence relating to vitamin C (ascorbic acid) should be referred to the Directorate of Medical Supplies, Portland House, Tothill Street, London, S.W.1.

Resignation

Mr. J. R. Walker, Divisional Food Officer for the Northern Ireland Division, has been recalled to the Northern Ireland Civil Service after serving since June, 1940, first as Deputy Divisional Food Officer and latterly as Divisional Food Officer.

Mr. J. C. Orr, Deputy Food Officer in the Northern Ireland Division, has been promoted to fill the vacancy with effect from April 1, 1946.

Prices and Use of Semolina

An Order has been made further amending the Flour Order, 1945, as amended, increasing the prescribed price for semolina produced in the United Kingdom by 20s. per 280 lb. in the case of sales otherwise than for export, and increasing by ½d. per lb. the maximum price of semolina when sold by retail, except when packed in ½-lb. containers.

The amending Order also removes the restriction on the use of semolina in the production of meat or fish paste or any other manufactured product containing meat, and came into force on April 28, 1946.

Olives and Capers in Brine

The import will be allowed under licence of a limited quantity of olives in brine from Greece and French North Africa, and capers in brine from French North Africa.

The Ministry of Food will recommend the Board of Trade to issue import licences only to those applicants who imported the above-mentioned commodities during the twelve months ended August 31, 1939.

Section of the "Battle for Bread" Exhibition.

The Battle for Bread

One of twenty exhibitions, which will tour Great Britain during the months of May to August, was opened by the Rt. Hon. Sir Ben Smith, Minister of Food, on May 1. Their purpose is to explain to the public how the present food crisis has arisen and to show what the ordinary man or woman can do to help fight the Battle for Bread.

The exhibitions consist of twenty-four pictorial and descriptive panels in black-and-white and colour. The story they tell falls into eight parts.

(1) The pre-war trade in wheat.
(2) The effect of war on wheat production.
(3) The farmer's difficulties in war areas.
(4) D-day, V-day, and then hunger.
(5) Rice and hunger in Asia.
(6) Drought and flood attack the world's grain supplies.
(7) International action calls for sacrifices all round.
(8) What we can do in Britain to help.

In an annex to the exhibition a Food Advice Centre demonstrates how to keep bread fresh, and how to make attractive dishes from stale bread.

Three informative leaflets are being distributed to visitors to the exhibition.

Oils and Fats

There will be no change in the existing prices of refined oils and imported edible animal fats allocated to primary wholesalers and large trade users during the eight-week period April 28 to June 22, 1946.

Transport of Flour Mixtures

An Order revoking Article 3 of the Directions dated May 7, 1942 (S.R. & O. 1942 No. 872), which have already been revoked in so far as they relate to flour, has been made. This will mean that a licence is no longer required for the transport of any flour mixture from Great Britain to Northern Ireland or from Northern Ireland to Great Britain.

Removal of Transport Restrictions

An Order removing the restrictions on the transport of oatmeal, oat flakes, and oat flour between Great Britain and Northern Ireland has been made. The Order came into force on May 1, 1946.

Canned Puddings

An Order amending the Canned Puddings (Maximum Prices) Order (S.R. & O. 1945 No. 1408) has been made. The amending Order permits certain additions to and deductions from the maximum prices of canned sweet puddings. The only effect on retail prices will be in certain remote districts of Scotland, where increases of ½d. or ¼d. per can are made to cover additional transport costs.

Vitamin B_1 (Control) Order

The Vitamin B_1 (Control) Order, 1941 (S.R. & O. 1941 No. 183), which provides for the control of the manufacture, production, sale, and use of vitamin B_1 for any purpose except medicinal, pharmaceutical, or scientific uses, will be revoked from June 30, 1946.

Conference on Over-fishing

The International Conference on Overfishing finished its meetings on April 5.

This Conference had been called for the purpose of examining the question of overfishing, and, if possible, of drawing up some form of regulatory agreement among the nations concerned. Such an agreement is regarded as essential if a recurrence is to be avoided of what took place after the 1914-1918 war with such disastrous results, when the stocks of fish which accumulated during the war years in the North Sea, for example, were rapidly depleted by overfishing, and fishing operations soon became uneconomical.

The conclusions of the Conference have now been published in a Government White Paper, Cmd. 6791. This White Paper sets out the Final Act of the Conference and a Convention which all the delegations at the Conference signed, and which the countries concerned have been invited to ratify at the earliest possible date.

The Conference lays down sizes for the mesh of fishing nets and size limits for under-sized fish somewhat larger than those provided for in the London Agreement of 1937, which at the outbreak of war had not been ratified by certain countries and was not, therefore, fully in operation.

The Conference did not come to any conclusion with regard to any other methods of regulating fisheries in the North Sea and other areas adjacent to the British Isles to prevent overfishing in future, but recommended in the Final Act that a Standing Committee should be set up by the British Government consisting of one delegate and one expert from each of the countries affected for the purpose of examining the whole position and making early recommendations to the Governments concerned as to any further methods of regulation.

Information and Advice

Synthetic Grease for Tins

B.1049. *Information required regarding the composition of the synthetic substance now being used by the baking industry in place of lard for greasing cake tins, etc.* (London.)

The only "synthetic" substances which, to our knowledge, are being used at present for this purpose are emulsions of oil and water. These are prepared by certain firms who specialised in the making of emulsions prior to the war and are sold only to those bakers who bought them before the war commenced. The emulsions are generally about 40 : 60 or thereabouts, and are stabilised by the use of gums or lecithin.

Some bakers make up their own emulsion for this purpose using one part lecithin in two parts water at 120° F., then adding to it three parts melted fat or cooking oil. Such a mixture when well whisked together can be successfully used for greasing bread tins, cake tins, etc.

Cake Powders and Meringue Powder

B.947. *Formulae and methods for the manufacture of cake powders and meringue powder.* (Staffs.)

The following is a recipe for a good class cake flour which could be used when the materials are available. At the present time, when dried egg powder is scarce and not permitted to be used in cake flours, it can be replaced with potato flour to make the usual quality of cake flour at present being produced by packers of this commodity.

Flour	80	lb.
Baking Powder	4½	,,
Dried Egg Powder or Potato Flour ...	4	,,
Soya Flour	10	,,
Salt	1¼	,,
Almond Flavour	3	oz.
Egg Colour	5	,,

This makes a suitable cake flour mixture for packing ready to make home-made cakes and steamed puddings. It is also suitable for the making of batters for Yorkshire pudding, fritters, and pancakes.

The ingredients should be thoroughly mixed together before passing through the sifter ready for packing. The baking powder used should consist of two parts cream powder to one part bicarbonate of soda.

Almond or vanilla flavour should be used to flavour the cakes. It is not absolutely necessary, but improves the flavour of the product. Powdered flavour can be bought for this purpose, but liquid flavours may also be used. The egg colour should be a good colour in powdered form.

These small quantities of flavouring and colouring should first be mixed into a small portion of flour before mixing into the bulk, in order to get them thoroughly distributed throughout the flour.

With regard to meringue powder, there does not seem to be much literature on this subject. Some are produced from a mixture of egg albumen and dried blood albumen, while others contain some vegetable proteins.

Information Supplied

B.825. *Names and addresses of manufacturers of small dehumidifying cabinets.* (Yorks.)

B.832. *Manufacturers of pelleting machines in the United Kingdom.* (London.)

B.833. *Details of pickle and sauce manufacture and manufacturers of requisite machinery.* (London.)

B.834. *Particulars of the latest method of processing dates for packeting.* (Newcastle.)

B.835. *Manufacturers of tin openers for opening biscuit tins.* (London.)

B.836. *Names and addresses of suppliers of equipment for the manufacture of macaroni.* (Bolivia.)

B.837. *Suppliers of citrus fruit juice extractors.* (London.)

B.839. *Manufacturers of plant suitable for the production of mayonnaise.* (Eire.)

B.857. *Information as to the development of artificial casings for edible purposes.* (Scotland.)

B.873. *Names of firms undertaking research in baking by electric rays.* (South Wales.)

B.874. *Details of the processing of oven-baked beans with tomato sauce for packing in glass jars.* (Scotland.)

B.875. *Names and addresses of firms manufacturing macaroni.* (Glam.)

B.876. *Suppliers of oat flour and barley flour.* (Lancs.)

B.877. *Particulars of suppliers of machinery for the manufacture of macaroni and vermicelli.* (Suffolk.)

B.878. *Suppliers of a dried vegetable powder for enriching gravies and soups.* (Singapore.)

B.879. *The types of material added to table salt to prevent caking and to ensure free running.* (Southern Rhodesia.)

B.880. *Suppliers of sweet medicated tablets for the confectionery market.* (Iceland.)

B.884. *Names and addresses of manufacturers of machinery for filling, weighing, packing, and sealing packets of flour up to and including 3 lb.* (Lincs.)

B.887. *Manufacturers of an electro-magnet suitable for extracting impurities in dried fruit, particularly dates.* (Sussex.)

B.890. *Details regarding the manufacture of black and white puddings.* (Scotland.)

B.895. *Information on the use of saccharin in the preparation of aerated waters.* (Ceylon.)

B.907. *Manufacturers of tin-tie closures for paper bags.* (Lancs.)

B.913. *Suppliers of machinery for making wheat flakes.* (Glos.)

Information Required

B.1031. *Names and addresses of manufacturers of envelope type lead foil bags in Great Britain or America.* (Scotland.)

Recent Patents

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents," and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Specifications Published

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

575,002. WIESELTHIER, L. M., and HEIBER, Z.: Manufacture of bread, confectionery, and the like.

575,042. CLARKE, D. H.: Machine for soldering the lids of large tinplate food containers and the like.

575,118. REAVELL, J. A.: Methods of and means for preparing concentrated liquid or solid extracts of tea or coffee.

575,160. HAUSER, C. G., MILLER, H. J., and BIERBAUM, H. O.: Milk food product and process of manufacturing same.

575,457. SPITZER, F.: Process for treating abomasum for manufacture of rennet.

575,483. DAVIES, L. E.: Topping machine for canning.

575,539. ALFA-LAVAL CO., LTD., and CLARK, T. L.: Taps for use in milking machine installations.

575,565. MAREK, A. J.: Can openers.

575,586 and 575,587. CARRICK'S (CATERERS), LTD., and STEEL, D. W.: Apparatus for preparing tins for baking buns, cakes, and the like.

575,783. SPOONER, W. W.: Cooking of food.

575,794. BRITISH THOMSON-HOUSTON CO., LTD.: Refrigerators.

575,932. SANDERS, G. P.: Method of treating cheese.

576,307. WAGER, H. G., and EDE, A. J.: Scalding of vegetables.

Abstracts of Recent Specifications

Method of and Apparatus for Removing Scales from Fish

The invention relates to a method and apparatus for removing the scales from fish.

In the preparation of fish, either for storage purposes, for conversion into other forms (such as fish cakes, chowder and the like for canning) or for immediate use, an essential preliminary step is the removal of the scales from the body portions.

At the present time, this operation is largely if not entirely performed by hand operations, and such operations are advantageous in that the operator can take into consideration the particular kind of fish he is handling, in each case, its size and condition, and the treatment necessary. But such operations are unavoidably slow and difficult, and also inherently variable in the matter of carrying them out and in the results obtained. On the other hand, such mechanical apparatus as has been devised and used to effect this operation, for example a rotary cage in which the fish are agitated under the sprays of water, is either so severe in its action upon the fish that it cannot be safely used with fish of many different species or is too weak to be adequate or effective upon others.

It is therefore an object of this invention to provide a method and apparatus adapted to remove the scales from fish completely and automatically, and yet with such an action that, while it may be proportionate to the resistance of the scales so as to effect their removal, it will not disrupt the portions of the skin or of the body beneath the scales, whether the fish be one which is hard and firm or soft and easily torn, large or small, or even of irregular or unusual shapes.

In the present process the fish, preferably wet and either singly or in appreciable masses, are caused to pass freely and under their own momentum or weight, as by gravity, against and across a scaling surface. This scaling surface is characterised by a plurality of elements having sharp edges which are disposed in the same general plane, but which are spaced apart and preferably define free openings through the surface adjacent thereto.

In operation, the fish are passed against and preferably across such a scaling surface or screen without being compressed against it other than lightly, as by their own weight or momentum. This is conveniently effected by gravity and by simply inclining the scaling surface. The openings being much smaller than any of the fish—even though an extreme range of mixed sizes of fish may be under treatment—none of the fish can fall through. On the other hand, the openings are sufficiently large to permit the scales and even small pieces which may become detached from the fish, as refuse, to pass through the mesh openings and thus be separated from the fish during the scaling operation—as well as accumulations of scales upon the surfaces and between the masses of fish which have been descaled.

570,809. D'Arcy Melville Clark.

Trade Marks

The list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal" and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

FAR-NORTH.—634,616. Meat paste and fish paste. **Farquhar North and Co., Ltd.**, Shenton Street, London, S.E. 15.; Manufacturers.

CHRYSTOSE.—636,095. Sweets (not medicated) containing glucose. **George Wright Taylor**, 40, Duncombe Street, Walkley, Sheffield; Manufacturer and Merchant.

FRUJEN.—636,551. Malt and malt extract. **Montgomerie and Co., Ltd.**, 174, West George Street, Glasgow; Millers and Malt Extract Manufacturers.

SCRIBONA.—636,565. Cooked, dried, or preserved meats. **Scribbans and Co., Ltd.**, 113, Corbett Street, Smethwick, Stafford; Cake Manufacturers.

CALIPHAT.—636,664. Dates. **Gray, Mackenzie and Co., Ltd.**, 122, Leadenhall Street, London, E.C. 3; Merchants.

New Companies

Golden Grille Crisps, Limited. (401421.) 150, High Street, Herne Bay. To carry on bus. of manufacturers of and dealers in potato crisps, etc. Nom. cap.: £5,000 in £1 shares. Dirs.: H. V. Tooley, 11, Graystone Road, Whitstable; H. S. Harvie, Boldrewood, Ramsgate Road, Broadstairs; L. Mell, 3, Station Road, Birchington; J. P. Wild, The Glen, Chestfield, Whitstable.

L.A.M. (Foods), Limited. (401429.) 11, Ironmonger Lane, E.C.2. To carry on bus. of growers, cultivators, dehydrators, and dealers in cereals, fruit, vegetables, corn, flour, and other foods and provisions, etc. Nom. cap.: £10,000 in £1 shares. Dirs.: L. A. May, "Cuelin," Garth Way, Letchworth; A. P. Harrison, The Red House, Crockham Hill, near Edenbridge; L. W. Roche, 34, Dunbar Street, Cork; G. E. Hecht, Southfield House, Wells, Somerset.

C.O.Y. Research Co., Limited. (403060.) 37, Drury Lane, W.C.2. To acquire certain patents relating to fruit, vegetable, and medicinal plant juices, etc. Nom. cap.: £100 in £1 shares. Dirs.: H. E. Chapman, 67, Burnt Ash Road, S.E.12; A. Olmi, 14, Colburn Avenue, Hatch End, Middlesex; J. G. W. Yager, 30, Grange Street, W.1.

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